05-11-07

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Atty. Dkt. No. 051264-0306

CC

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Frank D Husson, Jr.

Title: SOLAR WATER HEATER AND PASTEURIZER

Appl. No.: 10/039,277

Filing Date: 1/4/2002

Examiner: Carl D. Price

Art Unit: 3479

Confirmation Number: 1245

CERTIFICATE OF EXPRESS MAILING
I hereby certify that this correspondence is being deposited with the United States Postal Service's "Express Mail Post Office To Addressee" service under 37 C.F.R. § 1.10 on the date indicated below and is addressed to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

EV 727835436 US (Express Mail Label Number) May 9, 2007 (Date of Deposit)

Juliene P. Britt
(Printed Name)

(Signature)

APPEAL BRIEF TRANSMITTAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith is an amendment in the above-identified application.

[X] Appeal Brief (23 pages, with 7 appendices, 5 exhibits-1 exhibit containing 16 references).

[X] Credit Card Payment Form.

[X] Return Postcard.

[X] Small Entity status under 37 C.F.R. § 1.9 and § 1.27 has been established by a previous assertion of Small Entity status.

[X] The fee required for additional claims is calculated below:

05/14/2007 AADOF01 00000009 10039277
01 FC:2402 250.00 OP

05/14/2007 AADOF01 00000009 10039277
02 FC:2255 1080.00 OP

	Claims As Amended		Previously Paid For		Extra Claims Present		Rate		Additional Claims Fee
Total Claims:	23	-	56	=	0	x	$50.00	=	$0.00
Independent Claims:	2	-	9	=	0	x	$200.00	=	$0.00
First presentation of any Multiple Dependent Claims:						+	$360.00	=	$0.00
							CLAIMS FEE TOTAL	=	$0.00

[X] Applicant hereby petitions for an extension of time under 37 C.F.R. §1.136(a) for the total number of months checked below:

[ ]	Extension for response filed within the first month	
[ ]	Extension for response filed within the second month	
[ ]	Extension for response filed within the third month	
[ ]	Extension for response filed within the fourth month	
[X]	Extension for response filed within the fifth month	$2160.00

[X]	Appeal Brief Fee	$500.00
	FEE TOTAL:	$2660.00
[X]	Small Entity Fees Apply (subtract ½ of above):	$1330.00
	TOTAL FEE:	$1330.00

A credit card payment form in the amount of $1330.00 is enclosed.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-0872. Should no proper payment be enclosed herewith, as by the credit

card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-0872.

If any extensions of time are needed for timely acceptance of papers submitted herewith, applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-0872.

Please direct all correspondence to the undersigned attorney or agent at the address indicated below.

Respectfully submitted,

Date May 9, 2007

By _____

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Atty. Dkt. No. 051264-0306

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Frank D. Husson, Jr.

Title: SOLAR WATER HEATER AND PASTEURIZER

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(Printed Name)

(Signature)

BRIEF ON APPEAL

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Under the provisions of 37 C.F.R. § 41.37, this Appeal Brief is being filed together with a credit card payment form in the amount of $1,330.00 covering the 37 C.F.R. 41.20(b)(2) appeal fee for a small entity and a five-month extension. If this fee is deemed to be insufficient, authorization is hereby given to charge any deficiency (or credit any balance) to the undersigned deposit account 50-0872.

REAL PARTY IN INTEREST

The real party in interest in this appeal is Solar Solutions, LLC, 10080 Willow Creek Road, San Diego, California, USA.

RELATED APPEALS AND INTERFERENCES

This Appeal is not related to any other Appeals or Interferences.

STATUS OF CLAIMS

The present application was filed on January 4, 2002, with 53 claims. In the first, three-and-a-half years after filing of the application, four office actions and corresponding responses and/or Requests for Continued Examination (RCEs) were generated, as a result of which claims 1, 3, 6, 7, 9, 10, 12-15, 17-22, 26, 37-39, 43, 44 and 47 remained pending.

On November 30, 2005, another non-final Office Action was issued rejecting claims 1, 3, 6, 7, 9, 10, 12, 13, 17-22, 26, 37-39, 43 and 47 under 35 U.S.C. § 103(a) as allegedly being unpatentable over a combination of **five** references, including two newly cited references. Specifically, the claims were rejected as allegedly being unpatentable over GB 1 517 449 (hereinafter "the '449 Patent") in view of SODIS Technical Note #17, SODIS Bags and Temperature Sensors (hereinafter "SODIS"), U.S. Patent No, 4,557,251 to Burkhardt (hereinafter "Burkhardt"), U.S. Patent No. 3,939,968 to Ryder (hereinafter "Ryder") and U.S. Patent No. 2,847,076 to Brewer (hereinafter "Brewer"). Claims 10, 14, 15 and 44 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of '449 Patent in view of SODIS, Burkhardt, Ryder and Brewer.

After conducting an Examiner Interview on March 22, 2006, Appellant filed a response on April 28, 2006, further amending claim 1.

In a Final Office Action dated July 10, 2006, the Examiner maintained the rejection of claims 1, 3, 6, 7, 9, 10, 12, 13, 17-22, 26, 37-39, 43 and 47 over the combination of the five references referred to above. In addition, claims 10, 14, 15 and 44 were newly rejected

under 35 U.S.C. § 103(a) as allegedly being unpatentable over the combination of the five references referred to above and further in view of U.S. Patent No. 6,263,870 to Stouman.

Appellant timely filed a Notice of Appeal on October 10, 2006.

STATUS OF AMENDMENTS

Appellant believes the most recent claim amendment, submitted in conjunction with the response filed on April 28, 2006, has been entered in full.

Appellant respectfully notes an inconsistency in the "Office Action Summary" page of the Office Action dated July 10, 2006, indicating that the Office Action was responsive to "communication(s) filed on 16 March 2005 and 14 September 2005." However, since the body of the action addresses the arguments and amendments made in the response filed by Appellant on April 28, 2006, it is assumed that those amendments were entered in full.

SUMMARY OF CLAIMED SUBJECT MATTER

The embodiments of the invention are directed to solar water pasteurizers and methods of assembly of such solar water pasteurizers. Accordingly, the invention provides simple, inexpensive and portable devices for heating and pasteurizing liquids (such as water) using solar energy as a heat source. Thus, a renewable supply of drinking water may be made available in a reliable and inexpensive manner.

As recited in claim 1, a solar water pasteurizer in accordance with the present invention comprises a flexible water-tight resealable container having a top and a bottom (See e.g., page 19, lines 9-27; Figs. 1-9). The bottom comprises at least one resealable opening, and the resealable opening comprises at least one water-tight spout with a mating resealable cap. One or more reuseable temperature indicators for indicating the temperature history of the water contained in the container are positioned within the resealable cap. The temperature indicator is a glass tube containing wax therein that melts at pasteurization temperatures. The solar water pasteurizer further comprises one or more energy converting structures therein, as an integral part of the container. The solar water pasteurizer also comprises a first insulation structure on the top of the container. The first insulation structure comprises gas contained within air-tight structures. The solar water pasteurizer also comprises a second insulation structure on the bottom of the container. The second insulation structure is selected from gas contained within air-tight structures, closed cell foam or open cell foam. The insulation structures collectively are sufficient to enable the pasteurizer to achieve water temperatures of at least 60 °C. As noted in the specification, at these temperatures, pasteurization of water in a reasonable period of time is

enabled. Specifically, temperatures of 60 °C or greater are sufficient to kill many bacteria and viruses that are the most common causes of acute diarrhea among children in developing countries (See page 2, lines 10-14). The insulation structures are an integral part of said container.

In another embodiment, as recited in independent claim 43, the present invention relates to a method of assembly of a solar water pasteurizer (See e.g., page 17, line 27-page 18, line 13; Figs. 1-9). The method comprises stacking first, second and third sheets of a flexible polymeric material and bonding the sheets together at or near the perimeters of the sheets to create a three-ply structure. The first and second sheets upon bonding form a water-tight container containing therein the third sheet. At least the first sheet is transparent. The second sheet is insulated and has an energy reflective layer thereon. The second sheet contains at least one water-tight spout with a mating cap. One or more re-usable temperature indicators are provided for indicating the temperature history of the water contained therein. The third sheet is an energy converting structure. The method further comprises stacking and bonding a fourth sheet of flexible polymeric material to the first sheet of material along the perimeter thereof. The fourth sheet provides a transparent insulating airspace.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The grounds of rejection to be reviewed on appeal are the Examiner's rejection of the claims under 35 U.S.C. § 103(a) over a combination of **five or more** references.

ARGUMENT

I. The Office Action fails to Establish a *Prima Facie* Case of Obviousness

In the Final Office Action dated July 10, 2006, the Examiner maintained the obviousness rejection of claims 1, 3, 6, 7, 9, 10, 12, 13, 17-22, 26, 37-39, 43 and 47 over the combination of the '449 Patent in view of SODIS, Burkhardt, Ryder and Brewer, as well as the obviousness rejection of claims 10, 14, 15 and 44 over the combination of the five above-noted references and further in view of Stouman. As described below, the rejections by the Examiner fail to satisfy the criteria for a *prima facie* case of obviousness.

In *In re Rijckaert*, 9 F.3d 1531, 1532, (Fed. Cir. 1993), the Federal Circuit outlined the burden on the PTO as follows:

> In rejecting claims under 35 U.S.C. 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 U.S.P.Q.2d 1443, 1444 (Fed. Cir. 1992). Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant. *Id.* "A *prima facie* case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." *In re Bell*, 991 F.2d 781, 782, 26 U.S.P.Q.2d 1529, 1531 (Fed. Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (CCPA 1976)). If the examiner fails to establish a *prima facie* case, the rejection is improper and will be overturned. *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988).

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some reasonable suggestion or motivation to modify the prior art reference or to combine reference teachings. Second, there must be a reasonable expectation of success of

achieving the desired goals. Finally, the prior art references when combined must teach all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the Applicant's disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). Additionally, the courts have held that an invention is not obvious solely because it is composed of elements that are all individually found in the prior art. In re Rouffet, 149 F.3d 1350, 1357 (Fed.Cir. 1998). As described below, in this instance, the test for obviousness is not met.

As noted above, Appellant's invention relates to a simple, inexpensive and portable apparatus for heating and pasteurizing liquids, such as for example water, and methods for using and forming the apparatus. In particular, the invention is directed to such an apparatus adapted to operate using solar energy as a heat source. As recited in independent claim 1, the invention apparatus comprises a flexible water-tight resealable container having at least one resealable opening. The opening includes at least one water-tight spout with a mating resealable cap, wherein one or more reusable temperature indicators for indicating the temperature history of the water are positioned within the resealable cap. The temperature indicator is a glass tube containing wax adapted to melt at pasteurization temperatures. Thus, by using the indicator, the user can be sure the contents of the apparatus are safe for consumption. Similarly, independent claim 43 recites an innovative method for assembly of a solar water pasteurizer.

The cited references, either individually or in combination, fail to disclose, teach or suggest the invention as recited in the independent claims.

Appellant's invention, as recited in the independent claims, distinguishes over the five references relied upon by the Examiner by requiring a solar water pasteurizer comprising: a flexible water-tight resealable container, a resealable opening having at least one water-tight spout with a mating resealable cap, one or more reuseable temperature indicators for indicating the temperature history of the water contained in the container positioned within the resealable cap, one or more energy converting structures, integrated into the container, a first insulation structure which includes gas contained within air-tight structures, a second insulation structure selected from gas contained within air-tight structures, closed cell foam or open cell foam, wherein the pasteurizer is enabled to achieve water temperatures of at least 60°C.

As acknowledged by the Examiner, the primary reference (i.e., the '449 patent) does not disclose at least two components of the claimed invention. First, the '449 patent fails to teach or suggest any temperature indicator or insulating structures. See Office Action dated July 10, 2006, page 6. Second, the '449 patent does not disclose or suggest achieving the minimum desired temperature of 60°C, instead only disclosing achieving temperatures of 58-59°C. See '449 Patent, page 2, lines 53-61.

The Examiner unsuccessfully attempts to overcome the acknowledged deficiencies of the primary reference by further reliance on four secondary references (SODIS, Burkhardt, Ryder and Brewer). As described below, the secondary references fail to cure the deficiencies of the '449 reference.

With reference to SODIS, the disclosure of SODIS clearly lacks several key features of the invention. For example, the SODIS reference fails to teach or suggest a solar water pasteurizer that includes one or more energy converting structures therein, a first and second insulation structure, or a temperature indicator positioned within a resealable cap which indicates that a temperature of at least 60°C has been attained. Instead, to the extent that the SODIS disclosure is even related to the present invention, it is limited to a bag for retaining water that includes a reusable temperature indicator which indicates whether a temperature of 50°C (inadequate to achieve pasteurization) has been obtained. There is simply no disclosure of any of the other features required by Appellant's water pasteurizer.

Next, with reference to Burkhardt, rather than a flexible device as recited by the present claims, Burkhardt relates to a solar water heater having a rigid frame. Thus, the device disclosed by Burkhardt is not conducive to use as a portable water pasteurizer. Further, Burkhardt fails to teach or suggest any temperature indicator(s).

Ryder is completely unrelated to the field of Appellant's endeavor as it discloses a system for holding contact lenses and, therefore, constitutes non-analogous art.

"In order to rely on a reference as a basis for rejection ..., the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re* Oetiker, 977 F.2d 1443, 1446 (Fed. Cir. 1992). Further, "[a] reference is reasonably pertinent if ... it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem." *In re* Clay, 966 F.2d 656, 659 (Fed. Cir. 1992). As applied to the

present case, no logic would lead an inventor seeking to develop a simple, inexpensive and portable device for pasteurizing water using solar energy to consider a contact lens holder for solutions to the problems related to such efforts.

Further, Ryder in no way relates to systems which use solar energy. Instead, the device disclosed in Ryder relies on an external heating device: "The contact lens holder 10 is then placed in a heating unit, such as an autoclave or boiler ...." See Ryder, col. 4, lines 23-24.

Accordingly, reliance on Ryder is clearly improper.

Finally, Brewer also fails to cure the deficiencies of the other references. Brewer does not disclose any device or apparatus for the heating and/or pasteurization of water. Instead Brewer discloses only a reusable temperature indicator. There is no teaching or suggestion in Brewer of using the disclosed temperature indicator in a pasteurization context. Consequently, there is no teaching or suggestion in Brewer to position the temperature indicator within a cap, as recited in the pending claims.

As noted recently by the U.S. Supreme Court, when looking at the teachings of multiple references, it is to be determined:

> ... whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit.
>
> *KSR Int'l Co. v. Teleflex, Inc.*, No. 04-1350 (U.S. Apr. 30, 2007).

In the present case, the Examiner identifies no clear suggestion or motivation (in any of the cited references) to combine any two or more references (let alone all five references as applied herein) to achieve Appellant's claimed invention. Although the Examiner

acknowledges the proper standard for teaching, suggestion and motivation to combine references, the Examiner fails to provide any explicit analysis to support the "apparent reason to combine" the references. Rather, the Examiner merely makes the unsupported assertion that one of ordinary skill would have combined the references. Appellant respectfully submits that the Examiner's assertion is without merit.

It is clearly only with improper hindsight, and only with benefit of Appellant's disclosure, that there is any motivation to undertake the required modification of each of the numerous prior art references to arrive at the present invention. Absent Appellant's disclosure, there is no motivation to combine any of the asserted references, and even if there was such motivation, there is simply no guidance as to which features one should pick and choose from each prior art reference in order to arrive at Appellant's invention. The cited disclosures are sufficiently disparate to require more than ordinary skill to combine without the benefit of hindsight.

II. The Examiner Must Consider Appellant's Submission of Evidence of Secondary Considerations of Nonobviousness

Appellant has previously submitted evidence of secondary considerations of nonobviousness in accordance with M.P.E.P. §§ 716.01 and 716.03. The evidence is re-submitted herewith in the Evidence Appendix.

As set forth in *Graham v. John Deere*, 383 U.S. 1 (1966), one of the factual inquiries to be considered in determining obviousness is evidence of secondary considerations, such as commercial success, unexpected results, long-felt need, failure of others, copying by

others, licensing, and skepticism of experts. M.P.E.P. § 2141. Evidence of secondary considerations must be considered by the Examiner in determining the issue of obviousness. M.P.E.P. § 716.01(a).

The previously submitted declaration of the inventor, Frank D. Husson, Jr., under 37 C.F.R. § 1.132 and accompanying exhibits (resubmitted herewith) clearly illustrate the need for effective, easy-to-use, low-cost water pasteurization devices in rural areas and underdeveloped nations where suitable drinking water may not be readily available. Further, the lack of suitable alternatives currently available in the marketplace illustrate the unmet need for such devices. The exhibits clearly indicate that embodiments of the present application provide simple, low maintenance systems with which users, including uneducated Third World residents, are able to produce safe drinking water. The emails submitted as evidence clearly establish a substantial worldwide need for a system such as that provided by embodiments of the present invention, as well as the interest in implementing production and distribution and expected commercial success of the low cost water heater and pasteurization system provided in the present invention.

Therefore, in light of the lack of a *prima facie* case of obviousness and the overwhelming amount of evidence of secondary considerations exhibiting nonobviousness, the Examiner's rejection of the claims cannot stand. For all of the above reasons, Appellant submits that the Examiner's rejection of the claims is wholly improper and must be reversed.

CONCLUSION

The pending claims of the present application recite patentable subject matter and are in condition for allowance. The rejections made by the Examiner should be withdrawn.

Respectfully submitted,

Date May 9, 2007

By _____

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Registration No. 51,182

CLAIMS APPENDIX

1. (Previously Presented) A solar water pasteurizer comprising:

a flexible water-tight resealable container, wherein said container comprises a top and a bottom, wherein said bottom comprises at least one resealable opening, wherein said resealable opening comprises at least one water-tight spout with a mating resealable cap, wherein one or more reuseable temperature indicators for indicating the temperature history of the water contained in said container are positioned within said resealable cap, and wherein said temperature indicator is a glass tube containing wax therein that melts at pasteurization temperatures;

one or more energy converting structures therein, as an integral part of said container,

a first insulation structure on the top of said container, wherein said first insulation structure comprises gas contained within air-tight structures, and

a second insulation structure on the bottom of said container, wherein said second insulation structure is selected from gas contained within air-tight structures, closed cell foam or open cell foam,

wherein said insulation structures collectively are sufficient to enable said pasteurizer to achieve water temperatures of at least 60° C, wherein said insulation structures are an integral part of said container.

2. (Canceled)

3. (Previously presented) A water pasteurizer according to claim 1, wherein said container comprises a polymeric material.

4-5. (Cancelled)

6. (Previously presented) A water pasteurizer according to claim 1, wherein said energy converting structure is darkly colored to enhance energy absorption thereof.

7. (Previously presented) A water pasteurizer according to claim 1, wherein said energy converting structure is black.

8. (Cancelled)

9. (Previously presented) A water pasteurizer according to claim 1, wherein said energy converting structure is flexible and expansive.

10. (Previously presented) A water pasteurizer according to claim 1, wherein said energy converting structure is pleated, or layered to maximize the surface area thereof.

11. (Cancelled)

12. (Previously presented) A water pasteurizer according to claim 1, wherein said energy converting structure is a two-sided panel.

13. (Previously presented) A water pasteurizer according to claim 12, wherein said panel is bonded to one or more interior surfaces of said container.

14. (Previously presented) A water pasteurizer according to claim 13, wherein said panel comprises flow structure that provides for flow of water from a first side of said panel to a second side of said panel.

15. (Previously presented) A water pasteurizer according to claim 14, wherein said panel comprises a perforated polymeric material.

16. (Cancelled)

17. (Previously presented) A water pasteurizer according to claim 1, wherein said insulating structure(s) comprise at least one inflatable airspace inside of said container.

18. (Previously presented) A water pasteurizer according to claim 1, wherein said insulating structure(s) comprise at least one inflatable airspace outside of said container.

19. (Previously presented) A water pasteurizer according to claim 1, wherein said insulating structure(s) comprise at least one inflatable airspace inside, and at least one inflatable airspace outside of said container.

20. (Previously presented) A water pasteurizer according to claim 1, wherein said insulating structure(s) are coextensive with said container.

21. (Previously presented) A water pasteurizer according to claim 1, wherein said insulating structure(s) on both the front and back of said container are inflatable.

22. (Previously presented) A water pasteurizer according to claim 1, wherein said first and/or second insulating structure comprises an energy reflective surface.

23-25. (Cancelled)

26. (Previously presented) A water pasteurizer according to claim 1, wherein said container comprises one or more hanging attachments to enable gravitational effects to dispel water.

27-36. (Cancelled)

37. (Previously presented) A method for the production of potable water, said method comprising exposing water contained within a water pasteurizer according to claim 1 to a suitable energy source for a time sufficient to pasteurize said water.

38. (Original) The method according to claim 37, wherein said suitable energy source is sunlight.

39. (Previously presented) A method for the pasteurization of water, said method comprising exposing water contained within a water pasteurizer according to claim 1 to a suitable energy source for a time sufficient to pasteurize said water.

40-42 (Cancelled)

43. (Previously presented) A method of assembly of a solar water pasteurizer, said method comprising:

stacking first, second and third sheets of a flexible polymeric material, bonding said sheets together at or near the perimeters of said sheets to create a three-ply structure, wherein said first and second sheets upon bonding, form a water-tight container containing therein said third sheet,

wherein at least said first sheet is transparent,

wherein said second sheet is insulated and has an energy reflective layer thereon, wherein said second sheet contains at least one water-tight spout with a mating cap, wherein said cap comprises a bracket for receiving one or more re-usable temperature indicators for indicating the temperature history of the water contained therein, intimately associated therewith, and

wherein said third sheet is an energy converting structure, and thereafter

stacking and bonding a fourth sheet of flexible polymeric material to said first sheet of material along the perimeter thereof, said fourth sheet providing a transparent insulating airspace.

44. (Original) A method of assembly according to claim 43, wherein said third sheet is perforated.

45-46. (Cancelled)

47. (Previously presented) A method of assembly according to claim 43, wherein said fourth sheet comprises a second resealable opening for the inflation of said insulating airspace.

48-56. (Cancelled)

EVIDENCE APPENDIX

I. GB Patent No. 1 517 449

II. SODIS Technical Note #17, SODIS Bags and Temperature Sensors

III. U.S. Patent No, 4,557,251 to Burkhardt

IV. U.S. Patent No. 3,939,968 to Ryder

V. U.S. Patent No. 2,847,076 to Brewer

VI. U.S. Patent No. 6,263,870 to Stouman

VII. Previously Submitted Evidence of Secondary Considerations of Nonobviousness (with Exhibits)

RELATED PROCEEDINGS APPENDIX

None.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Frank D. Husson, Jr.

Title: SOLAR WATER HEATER AND PASTEURIZER

Appl. No.: 10/039,277

Filing Date: 01/04/2002

Examiner: Carl D. Price

Art Unit: 3743

DECLARATION UNDER 37 C.F.R. § 1.132

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

PURPOSE OF DECLARATION

This declaration is to provide secondary considerations to traverse the rejection of this application in the Office Action dated September 16, 2004. The person making this declaration is the named inventor in the present application.

BACKGROUND

The invention relates to a simple, inexpensive and portable apparatus for heating and pasteurizing liquids, such as for example water, and methods for using and forming the apparatus. In particular, the invention is directed to such an apparatus adapted to operate using only solar energy as a heat source. As recited in claim 1 of the present application, the invention apparatus comprises a flexible water-tight resealable container having at least one resealable opening. The opening includes at least one water-tight spout with a mating resealable cap, which includes a bracket for receiving one or more reuseable temperature indicators. The temperature indicator is a glass tube containing wax adapted to melt at pasteurization temperatures. Thus, by

using the indicator, the user can be sure the liquid contents of the apparatus are safe for consumption. All references to the Solar Solutions water heater and pasteurizer or Aquapak included herein specifically refer to a device produced according to claim 1.

FACTS AND DOCUMENTARY EVIDENCE

The following exhibits are submitted to demonstrate the world wide need for and distinct advantages of a low cost and effective water pasteurization process, as provided in claim 1 of the present application. The documents submitted have been collected by the named inventor and demonstrate both a long felt need and expected commercial success of the claimed solar water heater and pasteurizer.

A communication distributed through the Department of Energy (DOE) and solar industry in April 2002 highlights the advantages and projected cost comparison for the solar water heater and pasteurizer (produced by Solar Solutions according to claim 1) relative to the existing methods of water treatment, shown here as Exhibit A. Simplicity of design and use is cited as a key advantage of the Solar Solutions water heater and pasteurizer as it eliminates the need for chemicals, electrical systems and heating lamps. The communication also states that manufacturing costs in Third World countries are expected to be less than $1, well below the costs of competing batch chlorine and UV-PV-filter systems.

As provided in Exhibit B, on April 29, 2003, Project Concern International (PCI) distributed the solar water pasteurization systems (the AquaPak, produced by Solar Solutions according to claim 1) to families in the rural community of Las Cuevitas, El Salvador to provide potable water to the residents. Prior to the distribution of the pasteurization systems, the community lacked adequate methods for the pasteurization of water, and without such methods or appropriate pasteurization devices generally consumed untreated lake water. On subsequent visits after distribution of the AquaPak, a PCI technician noted that the majority of families (22 out of 24) were pleased with the device, and any dissatisfaction with the device was due to either the time required for treatment, or a general lack of understanding of the relationship between unclean water and illness, and the need for clean water. On a visit 2 months after the initial

distribution of the AquaPak, the PCI technician noted that all families had continued to use the Solar Solutions AquaPak.

As provided in a paper prepared by the National Renewable Energy Laboratory (NREL) in January 1998, shown here as Exhibit C, consumption of potentially contaminated water leads to approximately 5 million deaths (mostly children) each year. Available treatment methods include treatment with chemicals and UV light, but such methods have their shortcomings. Chlorine treatment requires a continuous supply of chemicals and is only moderately effective, often requiring additional filtration steps. Large scale batch chlorination processes require trained operators and increase in complexity. UV lamp techniques similarly may require additional filtration steps, as well as the replacement of UV light bulbs. The paper further states at page iv that solar thermal pasteurization, while tending to cost more than alternative processes, may be the most effective processes and may require the least amount of overall maintenance. As provided on pages 50-54, the costs associated with the solar treatment devices illustrated in Exhibit C can be high. However, as provided in Exhibit A, the costs associated with manufacturing the Solar Solutions AquaPak are substantially lower than those for both UV and chlorine batch techniques, as well as orders of magnitude lower than the solar devices provided in the paper.

A note in the April 22, 2002 issue of BusinessWeek, presented herein as Exhibit D, reports that the Solar Solutions AquaPak (produced according to claim 1) hopes to cut down on the incidence of waterborne diseases in these Third World nations by providing a low-tech, low cost pasteurization device to eliminate harmful bacteria, viruses, and parasites from water. It is noted that prior to the AquaPak, no solar-powered pasteurization system cheap enough to deploy to Third World countries had been produced. The note quotes Jay Burch of the NREL as stating that the Solar Solutions AquaPak is roughly 10% of the cost of the next best type of solar purifier.

In the November 2004 issue of the Solar Cooker Review, the Solar Solutions AquaPak is described, provided herein as Exhibit E. The description states that proper use of the AquaPak can kill over 99.99% of waterborne pathogens present.

The inventor has contacted individuals in many Third World and lesser developed nations, as well as individuals associated with various international relief groups, in an effort to make available the Solar Solutions AquaPak, as presented in Exhibit F. Some of the countries contacted and/or where testing is currently underway include: Ghana (Exhibits F.1; F.5), Tajikistan (F.2), El Salvador (F.3; F.15), Nigeria (F.4), Kenya (F.6), Viet Nam (F.7), Cambodia (F.7), Uganda (F.8), Egypt (F.9), Liberia (F.12), and Mexico (F.14; F.16). The individuals contacted have expressed interest in the AquaPak since efficient low cost water pasteurization systems are in great demand in Third World and/or rural areas where potable water is unavailable.

The emails exchanged in Exhibit F.1 refer to the interest and need for producing potable water in Ghana and other developing countries.

The emails exchanged in Exhibit F.2 discuss a study being conducted of the AquaPakby UNICEF in Tajikistan and comment on positive results achieved in producing potable water.

The emails exchanged in Exhibit F.3 discuss distribution of the AquaPak in Cuevitas, El Salvador by Project Concern International.

The email in Exhibit F.4 is from a Nigerian interested in setting up a manufacturing and distribution facility for the AquaPak in Nigeria, and discusses the proposed introduction of the device to the Niger Delta Development Commission (NDDC).

The email in Exhibit F.5 is from the Olof Palme Peace Foundation, showing great interest in deployment of the AquaPak in Ghana, and further stating that the expected cost of the AquaPak (based upon manufacture in Ghana) would be affordable to the average Ghanaian.

Exhibit F.6, an email from an interested individual in Kenya, states that affordable clean water for human consumption is needed in both rural and urban locations and that commercial success of the device is achievable based upon expected production costs in Nigeria.

Exhibit F.7 is an exchange of emails with the International Development Enterprises (IDE) director for Viet Nam expressing an interest in testing the AquaPak in both Viet Nam and Cambodia.

Exhibit F.8 is an exchange of emails with a Ugandan individual detailing proposing the AquaPak to a USAID funded non-governmental organization (NGO) for distribution in Uganda.

Exhibit F.9 is an exchange of emails with a Director of the Wadi Environmental Science Center in Cairo, Egypt, discussing the need for low cost, effective water pasteurization devices in the Arab countries, including Egypt, as well as the possibility of producing devices in Egypt for less than US $1.

Exhibit F.10 is an order for the AquaPak from Solar Cookers International. The exchange also notes that the WAPI wax used to indicate a completion of the pasteurization process is working well in devices tested by another individual.

Exhibit F.11 is a request for the AquaPak from a Unilever Research and Development group located in Holland.

Exhibit F.12 is an email from the International Medical Corps regarding a desire to look into use of the AquaPak in Liberia.

Exhibit F.13 is an email exchange regarding manufacturing and distribution of the AquaPak in Kenya. The email further discusses production of the device and proposes additional demonstrations of the AquaPak in other Kenyan communities.

Exhibit F.14 is an email from an individual associated with Rotary International. The email notes that all parties viewing and testing the AquaPak device were impressed and wish to move forward with conducting a study of the effectiveness of the AquaPak. The email further details the presence of an individual in Mexico in the plastics industry with the manufacturing capabilities to produce the AquaPak.

Exhibit F.15 is an email regarding the deployment and study of the AquaPak in Las Cuevitas, El Salvador. (See also Exhibits B; F.3). In the email, the author states that in many instances, the man of the family takes the AquaPak when leaving to work in the field, thereby demonstrating both the portability and usefulness of the AquaPak.

Exhibit F.16 is an email expressing interest in the device and requesting suggestions for suitable test locations for the AquaPak. The email further states that the author is a member of a group interested in getting involved in clean water projects in Mexico.

DISCUSSION

The exhibits submitted with this declaration provide evidence of a substantial world wide need for low cost, efficient, portable, and easy to use solar pasteurization systems. Such solar pasteurization systems are necessary to reduce disease and death resulting from consumption of untreated water. Further, the exhibits provide evidence that prior to the Solar Solutions AquaPak, produced according to claim 1, no product meeting these needs was available. Finally, the exhibits provide evidence of the potential commercial success of the Solar Solutions water heater and pasteurization system produced according to claim 1.

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Inventor:
Full name of first inventor Frank D. Husson, Jr.
Inventor's signature Frank D. Husson
Date 3/4/05 Country of Citizenship USA
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Post Office Address 10080 Willow Creek Rd., San Diego, CA 92131

NATIONAL RENEWABLE ENERGY LABORATORY

United States Government Department of Energy Laboratory, Golden, Colorado

—Original Message—

From: Burch, Jay [mailto:jay_burch@nrel.gov]

Sent: Tuesday, April 09, 2002 10:04 AM

To: 'fhusson@solarsolutions.info'

Subject: RE: AquaPak Back Panel

The writeup that was distributed as a "Solar Buildings Program Weekly Highlight" is attached. It was distributed throughout DOE and the solar industry. It was the only highlight for this week.

<< SSI AquaPak weekly highlight.pdf> >

Weekly Highlight

Solar Water Pasteurization System

Water treatment in the developing world is a massive, complex problem. Staff investigated solar water pasteurization in the FY98 time frame as a potential niche market for solar products (Burch and Thomas, NREL/TP-550-23110; and Solar Energy Journal, Vol. 64, p. 87). The study concluded that the most viable solar pasteurization market was on the smallest scale: individual home or small home groups requiring under ~50 gal/day. The study compared pasteurization to alternative home-scale technologies, and hypothesized that required system costs might be acheivable with low-cost polymer collectors. The program conclusion was that suitable polymer materials and collectors should be developed and tested for durability first, before applying low-cost polymer technology to a niche market like water pasteurization. One of the consumers of the study was the development team at Solar Solutions, Inc. (SSI), in San Diego, CA. SSI has cited the NREL study as providing the technical motivation for their development. The SSI development work has been funded privately.

The SSI product is shown in Figure 1 below. It is basically a 1.4 ft^2 "batch" system, using solar to heat about 1.3 gallons of water up to pasteurization temperatures, indicated by melting of a 70 °C wax. The outer layers are constructed of UV-protected polymer films. Impulse heat sealing- a low-cost, low-tech technique- is used to seal the various layers. A convection gap is maintained by "bubble pack" material. A cylinder containing wax melting at 70C indicates when the process is completed and another cycle may begin. Up to 4 pasteurization cycles per day can be done. The system currently sells in the US for under $20, and SSI states the system could be manufactured abroad under $1 per unit. Assuming a de-rated daily production of three gallons (to account for cloudiness) and a product lifetime of 5 years (probably conservative), the cost/m^3 of treated water is displayed in Figure 2 as function of product initial cost. Discount rate was set to zero for this short lifetime. When compared to "batch chlorine" (basically adding bleach to water) on strictly cost basis, the unit should cost under ~$2. Similarly, compared to a home UV-PV-filter system, the unit should cost under $13. It should be remembered that other considerations are crucial for 3rd world application; a major advantage of solar pasteurization is its simplicity: no chemicals to run out, no lights to burn out, and no electronics to fail. NREL will place the product's glazing and absorber materials under accelerated testing, increasing the program's database of glazing and absorber materials for later products designed for U.S. use. SSI is planning to proceed through NGOs and other paths to develop manufacturing facilities in the 3rd world.

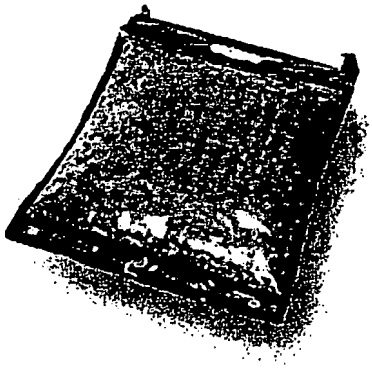

Figure 1. Solar Solutions, Inc. AquaPak solar water pasteurization system. The system aperture is ~14 in. square. The bubble-pack insulation on the top surface is discernible.

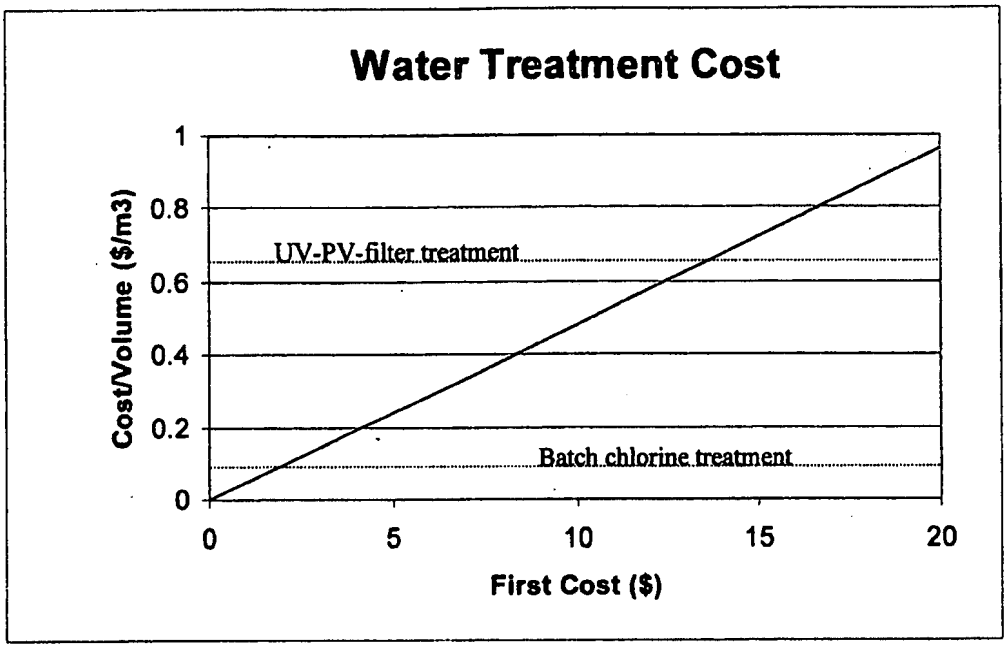

Figure 2. Water treatment cost ($/m^3) is shown as a function of the SSI AquaPak first cost. For economic comparison, batch chlorine cost and UV-PV-filter cost are shown as labeled, dashed lines.

Implementation of the AquaPak

in El Salvador

By

PROJECT CONCERN INTERNATIONAL

August 2003

PROJECT CONCERN INTERNATIONAL
August 2003

Summary of Implementation of Solar Water Pasteurizers, Agua Pak, in the Community of Cuevitas, Municipality San Antonio Pajonal, Department of Santa Ana, El Salvador

Project Background

In March of 2003, PCI signed a letter of agreement with the Trinational Comission of the Trifinio Plan to contribute to the sustainable and integrated development of communities in the Trifinio Region. Trifinio members profiled community projects in the Trifinio area which had been prioritized by local government officials. PCI personnel selected several of these areas, including Cuevitas for further investigation and project development. PCI's first intervention in the community after the realization of participatory surveys, was training and implementation of the Solar Water Pasteurizers, Agua Pak. Other activities have included the organization of a water administration board and community planning sessions for irrigation, agrotourism and potable water projects.

During July of this year PCI signed a letter of agreement with municipal and local governments as well as the Trinational Comission of the Trifinio Plan to implement an economic development project in Cuevitas within the framework of PCI's USDA IV food security project.

Community Profile

Las Cuevitas is a small community in the northwest corner of the department of Santa Ana in El Salvador. It is home to 35 families who make their living in and around the hydroelectric reservoir, Lake Guija. During the 6 month dry season, families from Cuevitas cultivate approximately 70 acres of land uncovered by the receding lake. During the rainy season these families sustain themselves with fishing activities. Both agriculture and fishing products are sold in Guatemala and El Salvador. The community is bordered by a national wilderness area and the lake.

Access to the community from El Salvador is limited to a single road during the dry season. During the rainy season the community is only accessible by boat and on foot. The community does not have access to electricity, potable water or adequate sanitation. Currently community members drink water directly from the lake without any type of treatment.

The community is well organized and has a local governing body named the Community Development Association which is recognized by municipal and national governments.

Project Description

Rural Participatory Survey

PCI technician, Noel Santamaria, in March of 2003 facilitated a Rural Participatory Survey which revealed that community members view economic development as the first priority for creating an environment for sustainable progress in Cuevitas. Potable water, electricity and adequate sanitation follow in rapid succession as community priorities.

Noel Santamaria continued community assistance activities through April and May with 4 participatory planning sessions for irrigation, potable water, economic diversification and agrotourism.

Training and Implementation

On Tuesday, April 29, 2003 Andrea Lamer facilitated a training session on the use of water filters according to the instructions found on the Agua Pak. PCI distributed all (30) of the water filters to the 26 families, the community school (1) and meeting house (1). Extra units (2) were assigned to the health promoter to lend to families with small children suffering with diarrheal disease.

Monitoring

During subsequent visits to the community, Noel Santamaria has monitored the use of the Agua Paks. During the first visit he found 24 homes using the Agua Paks. Two families manifested dissatisfaction with the process because of the time involved in treating the water and/or lack of understanding of the relation between unclean water and illness.

Noel Santamaria facilitated a refresher workshop Thursday, May 22 for all the families involved in the project. All families retained use of the Agua Paks. In his latest visit to Cuevitas on June 26, 2003, Noel Santamaria found all the Agua Paks in use.

NREL/TP-550-23110

An Overview of Water Disinfection in Developing Countries and the Potential for Solar Thermal Water Pasteurization

Jay Burch
Karen E. Thomas

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Golden, Colorado 80401-3393
A national laboratory of the U.S. Department of Energy
Managed by the Midwest Research Institute
for the U.S. Department of Energy
Under Contract No. DE-AC36-83CH10093

Prepared under Task No. SH71.3001/SH71.1001

January 1998

Executive Summary

This study originated within the Solar Buildings Program at the U.S. Department of Energy. Its goal is to assess the potential for solar thermal water disinfection in developing countries. In order to assess solar thermal potential, the alternatives must be clearly understood and compared. The objectives of the study are to: a) characterize the developing world disinfection needs and market; b) identify competing technologies, both traditional and emerging; c) analyze and characterize solar thermal pasteurization; d) compare technologies on cost-effectiveness and appropriateness; and e) identify research opportunities. Natural consequences of the study beyond these objectives include a broad knowledge of water disinfection problems and technologies, introduction of solar thermal pasteurization technologies to a broad audience, and general identification of disinfection opportunities for renewable technologies.

Waterborne disease is a staggering problem. Several billion people drink water potentially contaminated with pathogens that cause a variety of diseases. There are approximately 2.5 billion cases of waterborne sickness per year, causing about 5 million deaths per year (mostly children). Variables that are relevant to water disinfection problems and potential solutions include:

- Local population density: urban, village, and dispersed single family
- Existing water supply: deep-sealed well, shallow unsealed or sealed well, surface waters
- Water treatment: acceptable, questionable, or none
- Water pathogens: bacteria and viruses are ubiquitous, but protozoa and worms are localized
- Water turbidity: clean well water to "dirty" river water
- Water use: from several to several hundred liters per day per person
- Hygiene and washing practices: dependent on water supply and culture
- Availability of electricity: reliable, questionable, or none
- Local labor cost
- Income
- Infrastructure issues: varying access to supplies; training for operation, maintenance, and repair; and organizational support
- Education: implications for operation and maintenance of complex technologies
- Awareness of disease (the fecal-oral cycle): affects motivation to invest in and maintain water treatment.

Desired data are not readily available. The market segments of interest here are those with smaller volume/day demand (less than 25 m^3/day), including villages, and both dispersed and urban single family. Many authors believe that, for this market segment, the infrastructure issues are foremost in choosing the appropriate technology.

Water pathogens include bacteria, viruses, protozoa, and worms. Bacteria and viruses are readily treated with chemicals and ultraviolet (UV) light, but smaller bacteria and viruses are too small to be mechanically filtered. Protozoa and worms are larger and more easily filtered mechanically; however, they are resistant to chemicals and radiation. Turbidity in water allows viruses and bacteria to escape chemical and ultraviolet treatments. Water turbidity must be reduced by filtering to acceptable limits before chemical and ultraviolet techniques can be effective. Thus, chemical and UV treatments are almost always combined with filtering designed to reduce water turbidity to ~5 nephelometric turbidity units.

Disinfection methods appropriate for smaller-scale markets in the developing world include chlorination (dosing plant and batch processes), oxidant generation from electrolysis, slow sand filtration, household filtration, UV irradiation (from both sunlight and UV bulbs), boiling, and solar thermal pasteurization. These technologies are described, with emphasis on characterizing lesser-known solar thermal techniques. Solar

thermal pasteurization includes batch and continuous-flow devices. Commercial devices using domestic hot-water technology have recently become available. To determine if there is a potential role for solar thermal techniques, technologies are compared on the basis of economics and appropriateness.

Principal economic comparison indices are the life-cycle water treatment cost per unit volume and the capacity cost (first cost per unit volume capacity). Technology costs reported in the literature vary widely (factors of two or more). Cost estimates provided here are considered approximate averages that could vary more than a factor of two in particular cases. Appropriateness comparison is based on assessment of effectiveness and maintenance needs. Maintenance needs are broken down into need for supplies; need for skilled labor to operate, maintain, and repair the system; and need for unskilled labor for operation and maintenance.

Economic comparison of selected technologies is summarized in Figure 1. Recently emerging solar thermal pasteurization systems have a high cost compared to the village-scale technologies. On the home scale, boiling has no capacity cost, but has a very high treatment cost because of high fuel costs. Existing solar devices have a water treatment cost of an order of magnitude less than boiling.

Appropriateness comparison is difficult but critical in choosing a technology. Chlorination requires a continuing supply of fresh chemicals. Batch chlorination is very easy but only moderately effective. (Cysts, eggs, and high turbidity present problems that require filtering.) Chlorine-dosing devices in treatment plants require trained operators and increase in complexity with the size of the system. Water pretreatment with roughing filters is usually done in dosing plants. Slow sand filters are effective and low cost but require lots of maintenance and construction labor. Pretreatment with roughing filters is usually required. Household filtration units are moderately effective; however, they require consistent maintenance and are prone to failure from cracking and problems with bacteria and viruses. Batch UV sunlight methods are emerging that are very low cost and easy to use but are very small scale, moderately effective, and need further study. UV lamp techniques are moderately simple; however, high turbidity or cysts/eggs require filtering. The devices require access to infrastructure for bulb and power supply maintenance. Water boiling is common and effective but is extremely costly and laborious. Solar thermal water treatment costs are relatively high with current technology. For solar thermal pasteurization systems with metallic passageways, maintenance considerations might include scaling and freeze damage. These issues should be taken as restrictions on suitable sites, rather than as maintenance problems. Solar thermal is inherently very low in maintenance if these restrictions are followed. Solar thermal pasteurization is extremely effective against all pathogens, and does not require substantive filtering before treatment.

Solar thermal pasteurization tends to cost more than the alternatives, but is the most effective and (in some markets) requires the least maintenance. It is unclear whether appropriateness advantages will overcome cost disadvantages. Economic assessment is uncertain because solar thermal pasteurization is an emerging technology that has not yet been cost optimized to the extent that other technologies have. If costs of $\$380/m^2$ could be attained, home-scale use would be competitive with the best home filter and UV/photovoltaic (PV) system. If costs of $\$90/m^2$ could be achieved, village-scale application would become cost competitive with PV-driven ultraviolet techniques.

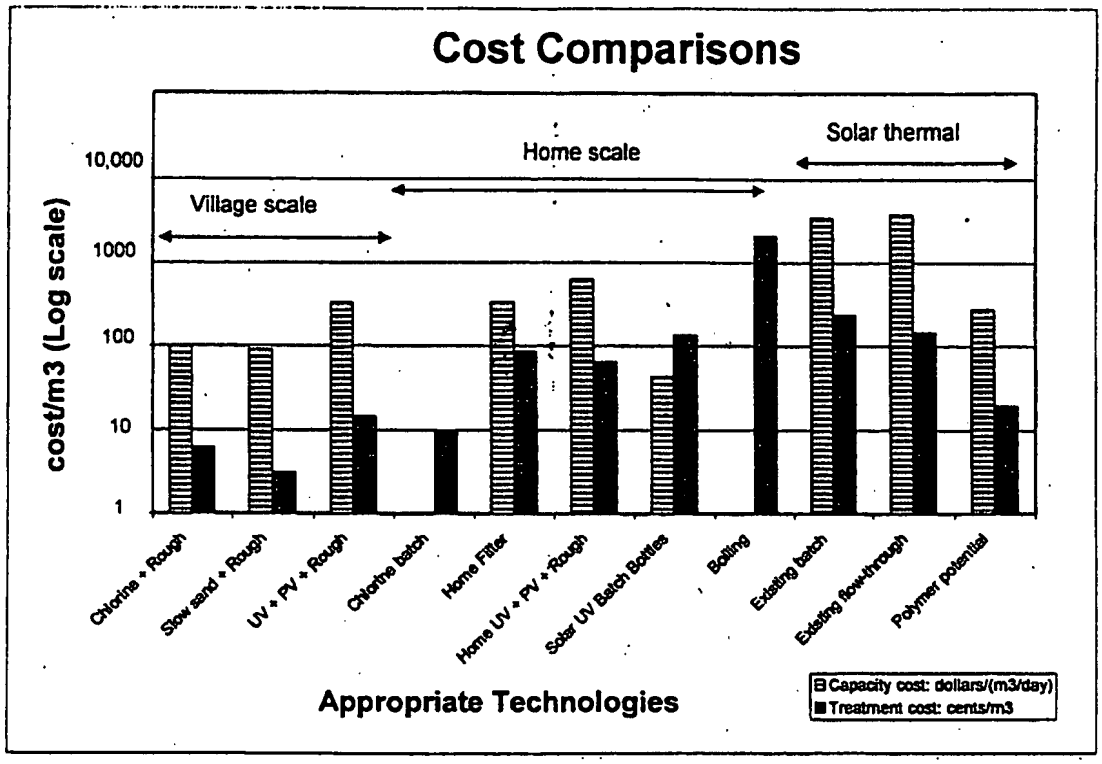


Figure 1. Cost comparison between selected small-scale water disinfection technologies. The y axis is the normalized costs on a logarithmic scale. The hatched bar is the capacity cost, which is first cost divided by the daily output of the system in $/m^3. The solid bar is the normalized life-cycle cost of water disinfection in cents/m^3.

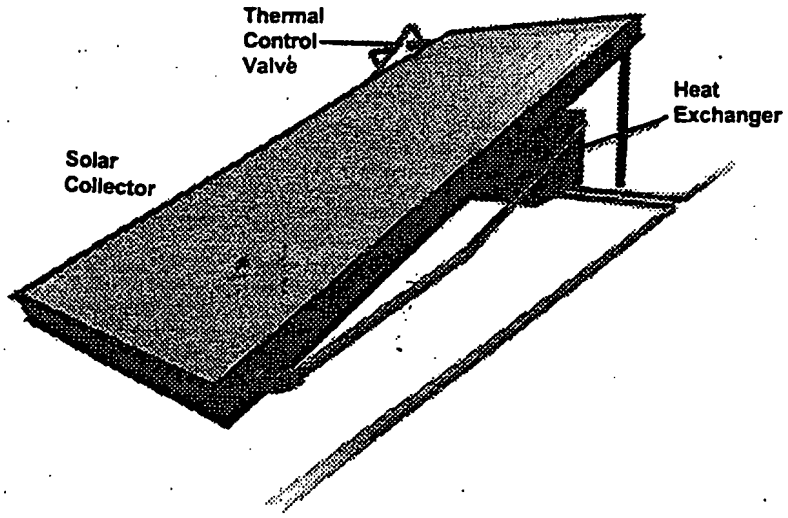


Figure 4.4.3.2-6. The Family Sol-Saver pasteurizer from Safe Water Systems (Hartzell 1997).

just released by Watts Regulator Company. The valve is driven by expansion/contraction of a wax phase-change phase-change material; at about 80°C the phase change drives the valve open. The valve has been tested without failure to 10^6 cycles. It is recommended that the seals in the valve be replaced every 10 years. A valve refurbishment kit (Viton O-ring and return spring) is supplied with the unit. A unique, ingenious, and attractive feature of the Family Sol-Saver is that it can be combined with the Wood-Saver unit (see Section 4.4.2.1) to provide a means of producing pasteurized water during cloudy/night periods. Such a device might be considered for any small-scale solar thermal device so that water supply during extended cloudy periods does not become a problem. Cost-effectiveness of the combined unit was not considered. An anti-scale magnetic conditioning device is provided with the unit. As far as we know, the effectiveness of the magnetic device has not yet been proven.

Cost

The Family Sol-Saver costs $1,650 FOB with user cost estimated at about $2,150. The combined cost of the Family Sol-Saver and Wood-Saver unit is $1,800 FOB. The cost of the heat exchanger is about $400, and the valve cost is about $100 (Hartzell 1997). It should produce about 570 L (150 gal) per day, based on five hours equivalent peak sun. Capacity cost for the Family Sol-Saver is estimated at $3,800/m^3/day and water treatment costs at $1.40/m^3.

Appropriateness

The first cost of the Family Sol-Saver is relatively high, as is the life-cycle cost of $1.40/m^3. However, the unit requires only valve maintenance, if scale and freeze damage are not concerns.

Parabolic-Trough Solar Pasteurization System

Compared to flat-plate collectors, concentrating collectors have the advantage of higher efficiency at higher operating temperatures. Sayigh (1992) studied a Fresnel reflector. A parabolic-trough system was proposed as the heat source for disinfection. A demonstration system was described by Anderson (1996) and is shown in Figure 4.4.3.2-7. It consists of a tracking parabolic trough, an inexpensive automotive radiator control valve, a patented counterflow tube and shell heat exchanger configuration compactly located beneath the absorber, and a PV-pumping system. (The pump power, pressure drops, and PV panel size were not given.) The heat exchanger configuration is shown in Figure 4.4.3.2-8, and includes wire windings to increase the film coefficient between hot and cold fluids. The inner pipe is dead space. Pumping is probably not optional because of the narrow absorber and return annuli. The effectiveness of the heat exchanger is about 67% for a single-trough configuration.

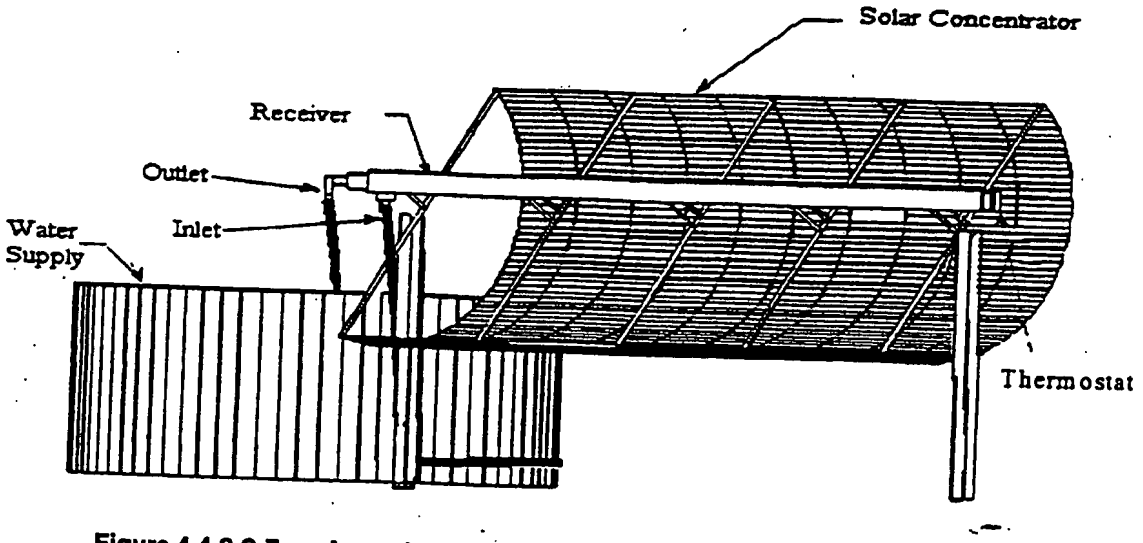


Figure 4.4.3.2-7. A parabolic-trough solar pasteurization system consisting of a tracking parabolic trough, control valve, patented counterflow tube and shell heat exchanger, and a PV-pumping system.

Cost

The trough first cost is $250/m^2$. (One trough is 6 by 2.3 m.) This is 15% below the current unit area cost for small-scale applications, because the automated controller will be omitted. The PV system was assumed to power a 40-W pump, and the sizing and costing methods in Appendix F were used for PV system costs. The heat exchanger construction is intended to be included in the estimated cost but may drive the cost higher. Maintenance is a significant issue. The reflector surface should be replaced every five years (Hale 1997) at a cost of $50/m^2$, including installation. PV system maintenance (battery replacement) was assumed to be $25/year. There can also be maintenance issues with the flexible-piping connections on trough systems (Hale 1997). The capacity cost for a trough system is estimated at $4,100/m^3$/day and water treatment cost at $1.74/m^3$.

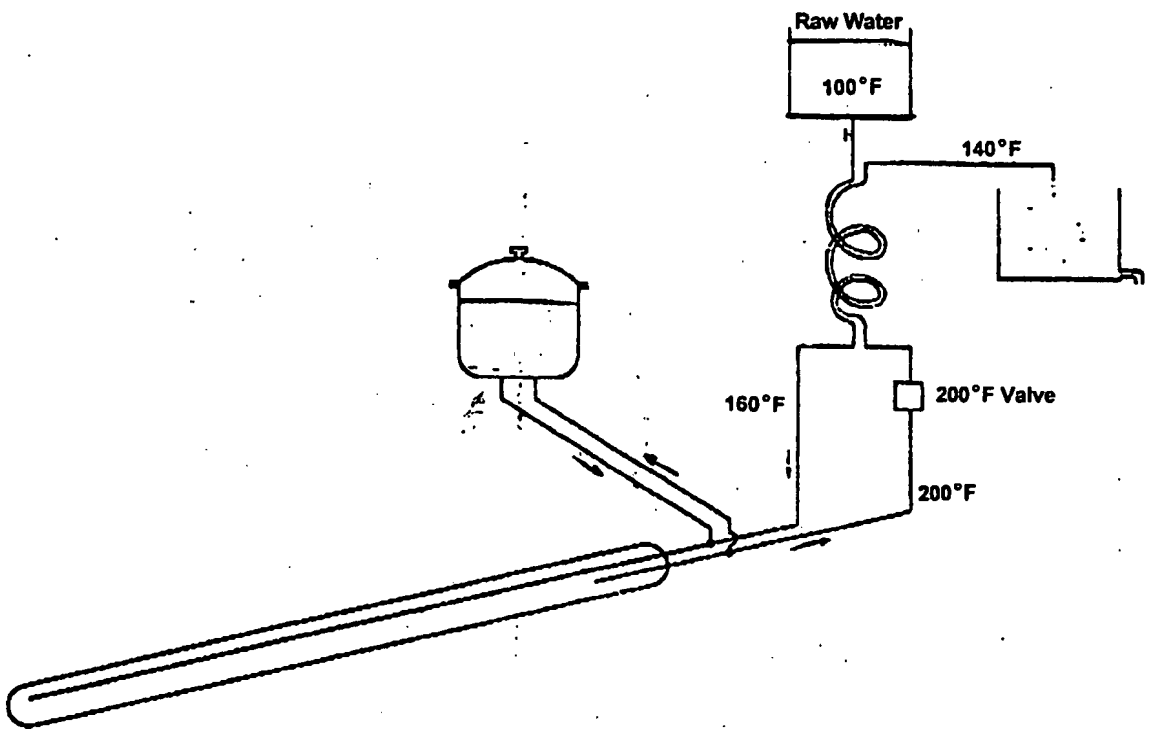


Figure 4.5.1-2. SUN multi-use system for single-family application.

4.5.2 Copper Sunsation Plus

A combined hot-water/pasteurization system is shown in Figure 4.5.2-1, with a schematic in Figure 4.5.2-2. It is in the final stages of development at Safe Water Systems, Inc. In this system, the water to be disinfected is heated until the wax-driven control valve (as described in Section 4.4.3.2.1) opens. The pasteurized water exits to a heat exchanger (a copper coil) located in the hot-water storage tank. The pasteurized water gives up a fraction of its energy before exiting. The hot water in the storage tank would presumably be used for bathing, according to the manufacturer. This would be satisfactory if cysts and worms that can penetrate the skin were not present in the water.

The Copper Sunsation is projected to be available in mid-1997 and to cost about $1,350 FOB. The system should not be used in climates with chance of freezing. Like all systems having collectors with metallic passageways, scaling maintenance is required in hard-water areas.

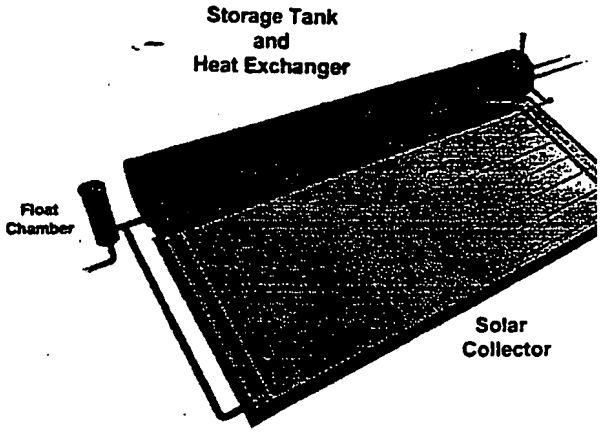


Figure 4.5.2-1. A combined hot-water/ pasteurization system. The system is in the final stages of development by Safe Water Systems, Inc.

Present flow-through solar systems cost approximately $600/m^2$, indicating good cost competitiveness with home filtering and far superior performance to boiling. However, solar water costs are high versus the larger-scale treatments and chemicals. Polymer systems may cost about $100/m^2$. These systems could compete with MOGGOD and the upper end of UV-lamp technologies, opening up the village-scale market to solar thermal technologies. The potential solar systems will not compete on cost alone with chlorination or with slow sand filters. Batch solar systems currently cost approximately $60/m^2$, competitive with home filtering and much more cost effective than boiling.

5.2 Solar Thermal Market Estimates

The potential market for solar thermal products justifies continuing research and development (R&D) in this area. Table 5.2-1 divides the market into three load strata. Within these three strata, we list potential market estimates for solar thermal systems. Although the raw potential market is huge (see Section 2.1), the practical market is considered much smaller (see Section 2.2), as summarized in the table. The maximum potential is approximately 1 million systems, mostly of the small single-family type. These estimates are highly uncertain but do provide order-of-magnitude values. Some of the considerations and numerical assumptions are discussed below.

Table 5.2-1. System Capacity/Water Volume and Markets for Solar Thermal Disinfection

Capacity Category	No. People Served	Volume (L/day)	Markets	Maximum No. of Solar Systems[4]
Small	5–50	20–200[1]	sf-1 to sf-5	1.6
Medium	10–100	100–1000[2]	v-1	0.08
Village	50–500	200–2000[3]	v-2,3	0.01

[1]Low-level single family is for drinking water/nonboiled cooking, at 4 L/person per day; high level is for drinking, hygiene, and bathing at 40 L/person per day.
[2]Health clinic water use is 10 L/person per day, drinking and hygiene.
[3]Public-tap usage at low volume is drinking only, at 4 L/person per day, and high volume at 40 L/person per day, for drinking and hygiene
[4]This column is the market size (see Section 2.2) times the estimated maximum solar penetration fraction.

5.2.1 Small-Volume System: Single Families

5.2.1.1 Urban Market (sf-1 + sf-3 Size is 5.8 Million)

The relevant market characteristics include pressurized private tap, electricity, good access to technical infrastructure, having access to resources, and willingness to pay (sf-1 especially). The competing technology options include chlorination, home filtering units, and "under-the-sink" UV-lamp units, in addition to boiling.

Batch solar pasteurizing is a good choice on the low-volume end. These units cost less today than potential small-scale UV systems or effective home filtering units. Low maintenance is important, but not as important as it is for the remaining single-family market. Storage vessels are required and solar access is an issue.

The *flow-through solar pasteurizer* might be a good choice on the higher end of volume needs. The high cost of present products relative to single-family resources seems to be an issue but may not be an impediment for

the wealthier segments. The potential exists for a very compact system (0.1 m^2). Potential polymer products may help the cost issue. Storage for hundreds of liters seems cumbersome for crowded urban areas, and again, solar access is an issue.

We conclude that solar thermal products may have some share of this market segment; however, uncertainty is increased by potential "on-demand" products that are more convenient. Projection is difficult, in part because future alternatives are unclear. Maximum market potential is about 20% of this segment, or about 1.2 million small systems.

5.2.1.2 Remote Single Family (sf-5 Size is 0.8 Million) and Peri-Urban (sf-2 Size is 1.3 Million)

Relevant market characteristics: no electricity, no pressurized water, access to technical infrastructure varies from poor (sf-5) to moderate (sf-2). Low ability to pay, low to no recognition of need for water treatment, especially sf-5. The competing technology options include chlorination and home filtering units.

Batch solar UV-A. The exposed plastic bags may be a good, low-cost option, suitable for the low-volume end, if thin-film issues can be resolved satisfactorily. The plastic bottles also appear to have the advantage of very low cost in both markets. Issues remain with performance in cloudy, windy, cold periods.

Batch solar pasteurizers appear to be a good choice, combining moderate first cost and low maintenance. Solar access and cloudy periods are issues.

Flow-through solar pasteurization. High first cost will remain a barrier because of low income, unless low-cost polymer systems are successfully developed. Low maintenance is a big advantage. Solar access and cloudy periods are issues. The potential exists for a very compact (0.1 m^2) system.

We conclude that batch solar thermal products might have a large share of this market segment. It will be very difficult to penetrate sf-5, but the peri-urban market, sf-2, can be more easily reached. For both segments, market potential is about 20%, or 0.4 million.

5.2.2 Medium-Volume System: Health Clinics (v-1 Size is 0.3 Million)

Relevant market characteristics: unpressurized water, no electricity, high motivation.

The competing technologies include chlorination, possibly an intermediate-size filtering device, and UV/PV/filtering. UV/PV/filtering appears to be a good option because no storage tanks would be needed. System maintenance in more remote areas is a crucial issue. Batch solar systems are too low in volume to be useful here.

Flow-through solar thermal. This is a good match in volume (e.g., Family Sol-Saver at 570 L/day) and effectiveness. Storage tanks would be needed. High current cost is a problem, with potential for low-cost polymer systems.

We conclude that flow-through solar thermal products may acquire modest market share, mainly because market access to technical infrastructure decreases. Assuming 25% market share, the solar thermal market is roughly 0.08 million systems. Because health clinic needs include sterilization, distilled water, cooking, and hot water, the most appealing products are solar thermal hybrid systems. Potentially, large market share might exist. However, these products are not well developed and are not considered further.

6.0 Research Recommendations

We examined water disinfection markets and technologies, with a focus on solar thermal opportunities. More R&D in solar thermal is needed to increase the attractiveness of this technology. Opportunities for other technologies are also identified. NREL teams focused on international markets for renewables should become knowledgeable on related water needs.

6.1 U.S. DOE Programs

6.1.1 Solar Buildings Program

Solar system costs should be reduced at all scales. On a small scale, existing solar batch products are already superior in cost-effectiveness to boiling and approach the high end of home filtering costs. Potential polymer systems could be more cost effective than competing home filter and home UV systems, and they are more effective. At moderate scales and above, flow-through solar costs begin competing with UV/PV/filters at around \$120/m^3, and with MOGGOD at about \$450/m^2. The latter cost goal can likely be reached with incremental cost-reduction activity on existing metallic products, and the former cost can possibly be achieved with polymer-based systems (see Section 4.4.3.2).

6.1.1.1 Incremental Cost-Reduction Strategy

The current industry solar-disinfection products would be aided by use of a low-cost heat exchanger designed specifically for a low Reynolds number and low pressures. For the Family Sol-Saver, for example, the tube and shell heat exchanger adds approximately \$400 to the retail cost. Metal tube and shell designs are industry standards when water is pressurized. For low pressures (gravity feed), we might anticipate use of a plate-frame, thin-film heat exchanger (as in Appendix G), with a retail cost of around \$50. This would decrease the Family Sol-Saver first cost by around 25%. The evacuated-tube systems offer a low collector loss coefficient and operation at lower irradiance. A flow-through system using evacuated-tube technology should be developed.

6.1.1.2 Polymer Systems

Polymer solar pasteurizers have many development issues in common with other possible polymer-based solar thermal applications (Burch 1997). A reasonable strategy views polymer water disinfection systems as being one of many similar systems that could follow from a unified research effort focused on polymer systems. It would be unwise to push a polymer-based disinfection system until polymer durability issues are satisfactorily resolved. If and when this is done, it may be reasonable to develop market applications. Also, the potential for collaborating on the development of disinfection technologies is high. Two U.S. solar thermal industry members and the EAWAG/SANDEC Center (a Swiss group) for water treatment in developing countries are investing in solar pasteurization.

6.1.1.3 Small-Scale Flow-Through Units

There are many market segments in the developing world and elsewhere that have very small-scale disinfection needs (approximately 10–20 L/day). Although very attractive batch units exist, there is potential for developing a very compact flow-through solar pasteurizer. With proper design, an approximately 0.1-m^2 system would provide about 20 L/day. A very compact, lightweight polymer product appears possible.

BusinessWeek
April 22, 2002

IN A PLASTIC BAG, CLEAN WATER FOR THE WORLD'S POOR

EVERY DAY, 10,000 CHILDREN die from cholera and other waterborne diseases, according to the U.N. Frank Husson, founder of Solar Solutions LLC, thinks he can cut this toll with a low-tech, low-cost plastic pouch that uses the sun's heat to pasteurize water and rid it of harmful bacteria, viruses, and parasites.

In the past, relief organizations have built solar-thermal systems out of metal and glass to purify water. But no one has created a solar-powered pasteurizer cheap enough to deploy widely in very poor areas. With that in mind, Husson's San Diego startup designed AquaPak out of black polyethylene, which is widely used in food packaging, and bubble wrap. Husson says the bags could be made in most Third World countries for as little as $1 each. That's roughly 10% of the cost of the next-best type of solar purifier, says Jay Burch, a solar specialist at the National Renewable Energy Laboratory.

NREL is testing the sack's plastic materials, which are key to its "goof-proof" design, as Husson puts it. When the 15-inch-a-side pack is filled with water and placed on the ground, sunshine warms the water while air-filled bubbles keep the accumulating heat from escaping. In tests, it took 90 minutes to heat the 1.2-gallon AquaPak to 158F. At that temperature, practically all pathogens are cooked after just six minutes.

Husson, who is funding the venture himself, now aims to share the AquaPak design with Third World entrepreneurs, the U.N., and other relief agencies. *Adam Aston*

SOLAR COOKERS INTERNATIONAL

Solar Cooker Review

NOVEMBER 2004 · VOLUME 10 · NUMBER 2 · CIRCULATION 9,000 WORLDWIDE

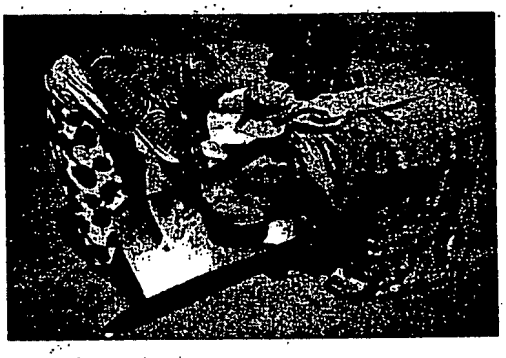
In This Issue

Solar Cookers International
1919 21st Street #101
Sacramento,
California 95814, USA
Tel. +1 (916) 455-4499
Fax +1 (916) 455-4498
E-mail:
info@solarcookers.org
Web:
www.solarcookers.org

SCI assists communities to use the power of the sun to cook food and pasteurize water for the benefit of people and environments.

Final Kakuma evaluation: solar cookers filled a critical gap

By **Kevin Porter**, SCI Education Resources Director



The following summarizes an independent study by Nairobi-based **Center for Independent Research**. The study was commissioned to review **Solar Cookers International**'s entire solar cooker project in Kakuma refugee camp in anticipation of SCI's phase out and eventual replacement by a refugee owned and operated cooperative. The evaluation took place in 2003, eight years after the project started and one year after free distribution of solar cookers and black pots transitioned to a sales-based program in the camp.

SCI's first field project — and its largest to date — began in January 1995 in Kakuma refugee camp in northwestern Kenya, then housing 28,000 refugees, primarily Sudanese and Somali, but also people from Ethiopia, Congo, Burundi, Eritrea, Rwanda and Uganda. The project started as a field test to determine the usefulness of SCI's simple, new panel-style solar cooker (the "CooKit") among these refugee families of various cultures. The CooKit proved useful, and SCI was urged to expand to additional refugee camps.

Continued on page 4

Indoor cooking smoke quietly killing millions

Even improved stoves usually generate smoke, while solar cookers are smoke-free

Women and children the world over are exposed daily to a quiet killer: indoor smoke. Only recently has the magnitude of this issue come to the forefront of international concern. Two recent publications — a 2004 briefing by the **Intermediate Technology Development Group** (ITDG) titled "Smoke: the killer in the kitchen," and the Spring 2003 magazine *Public Health* from the School of Public Health at the **University of California, Berkeley** — begin to quantify the negative health effects of exposure to indoor smoke on people in the developing world, especially women and chil-

Continued on page 2

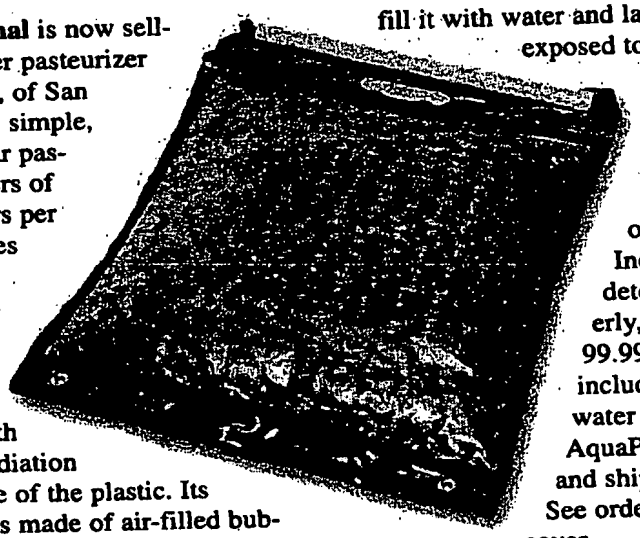
Volunteer Tom Sponheim inducted into SCI Order of Excellence

Solar Cookers International (SCI) recently inducted volunteer **Tom Sponheim** into its Order of Excellence. He is the seventh to earn this honor, which recognizes those whose "sustained efforts have contributed most to empowering people to cook food and pasteurize water with solar energy."

Tom Sponheim has been an active volunteer in solar cooker promotion for nearly 15 years. Early on, he founded and led **Solar Box Cookers Northwest** (SBCN), an all-volunteer organization based in Seattle, Washington, USA promoting solar cooking and information exchange. Its excellent newsletter, the *Solar Box Journal,* eventually merged with SCI's newsletter to become the *Solar Cooker Review.* In 1996 Tom urged SCI to begin using the Internet as a tool for information exchange. He created and continues to serve as Webmaster of SCI's first web site, the *Solar Cooking Archive* (http://solarcooking.org). To date the site has been visited over 1.25 million times, and is considered the most comprehensive solar cooking Web site in existence.

Thanks, Tom, for your tireless dedication to improving people's lives through solar cooking education. The entire world of solar cooking promoters is grateful to you.

New product alert: AquaPak now available



Solar Cookers International is now selling the "AquaPak" solar water pasteurizer produced by **Solar Solutions**, of San Diego, California, USA. This simple, unique device allows for solar pasteurization of four to five liters of water at a time, up to 15 liters per day. Weighing only six ounces when empty, the AquaPak is quite portable. Its dark, heat-generating bottom side is made from the same polyethylene plastic as food preparation boiling bags, with the addition of ultraviolet radiation inhibitors that extend the life of the plastic. Its transparent, insulating side is made of air-filled bubble pack sheeting. The AquaPak is easy to use: simply fill it with water and lay it on a relatively flat surfa exposed to the sun. A built-in Water P teurization Indicator (WAI contains wax that melts h when the water is heated t 67°C, often in two hours or less. (Pasteurization of wate occurs at approximately 65°C Independent laboratory tests determined that, when used pro erly, the AquaPak kills over 99.99% of pathogens present. An included filter may be used for water that contains sediment. The AquaPak sells for $20, plus sales t and shipping charges as applicable. See order form on the inside back cover.

Sharon Hanson

From: mavis sarpong [mavissarpongshipping@yahoo.com]
Sent: Friday, January 21, 2005 9:54 AM
To: Frank Husson
Subject: Re: AquaPak Solar Powered Water Pasteurizers

Dear Frank,
Thanks very much for your mail and the efforts put up to help developing countries who are in need of potable water. Since your project could be of great use to some part of Ghana, it is my fervent hope that I and my partners in Ghana to share this noble idea and do business with this. Hence I have forwarded your mail to them.

There are some few questions to be asked but the website given will help to illustrate some issues clearly.

I will revert back to you soon after reading through information extracted from the website.

Thanks very much.

From
Sarpong

Frank Husson <fhusson@solarsolutions.info> wrote:

> Dear Mr. Sarpong:
>
> It was nice to talk with you on the telephone this morning.
>
> Solar Solutions LLC is a family-owned humanitarian business that designs and manufactures products for use by people in the developing world. We have developed an inexpensive solar-powered water pasteurization device, the AquaPak, based on the 140 year old pasteurization process discovered by Louis Pasteur, primarily for the rural populations in developing countries and refugees. Using only solar energy, the AquaPak can produce enough potable water daily for a mother and child.
>
> The AquaPak can be manufactured for less than $1.00US each when using a labor rate of $0.60US/hour. Our business model is to help entrepreneurs and local businessmen set up independently-owned AquaPak manufacturing facilities in developing countries where the AquaPak could be manufactured for under $1.00 each.
>
> We are currently working with many humanitarian organizations and NGO's including UNICEF, Project Concern, Rotary International, etc. in conducting worldwide field testing of the AquaPak. The initial test results indicate the AquaPak is performing as expected and is providing safe drinking water to those in need.

Additional information about our company and the AquaPak is available at www.solarsolutions.info. We look forward to working with you to help bring potable water to those in need.

Sincerely,
Frank Husson

Sharon Hanson

From: Janine Chen [jchen@solarsolutions.info]
Sent: Friday, September 10, 2004 9:24 AM
To: fhusson@solarsolutions.info
Subject: FW: AquaPaks (Tajikistan)

For when Frank returns, if he would like to address this feedback.

Janine

-----Original Message-----
From: Murat Sahin [mailto:msahin@unicef.org]
Sent: Tuesday, September 07, 2004 7:07 PM
To: Janine Chen
Cc: 'Ikram Davronov'; 'Nargiz Babakhanova'; 'Yukie Mokuo'
Subject: RE: AquaPaks (Tajikistan)

Dear Janine,

Sanitary Epidemiological Station under Ministry of Health who is the main body responsible for Water quality monitoring in Tajikistan is testing the Aqua Packs in Moskovsky district among 25 households. We are expecting to have the results tabulated by the end of September and will be sharing with you soon after. Initial results show that water is safer and the hard ware is working properly however the main problem is the hygiene behavior of the people and handling of water within the household in the country. The aqua packs needs to be supported with a hygiene package and linked with hygiene promotion strategy which needs to be further developed.

As for the payment It is in process and I hope you will have it by next week. Best Regards

Murat Sahin
Child Development Project Officer
UNICEF Dushanbe
Telephone: ++992 372 218261/249108/249036
Facsimile: ++992 372 247788/510081
E-mail: msahin@unicef.org
Web: www.unicef.org

For every child
Health, Education, Equality, Protection
ADVANCE HUMANITY

"Janine Chen" <jchen@solarsolutions.info> 09/08/2004 12:48 AM

To: "'Murat Sahin'" <msahin@unicef.org>
cc: "'Yukie Mokuo'" <ymokuo@unicef.org>, "'Nargiz Babakhanova'" <nbabakhanova@unicef.org>, "'Ikram Davronov'" <idavronov@unicef.org>
Subject: RE: AquaPaks (Tajikistan)

Dear Murat,

I am emailing you to remind you of our need for an update on the progress of
the AquaPaks in use. Have you been able to test them? What are the results so far?

Mr. Husson is on a business trip to New York this week and is meeting with UNICEF this Friday. He would like to be able to understand the situation in Tajikistan before then.

Thank you,
Janine

10080 Willow Creek Road
San Diego, CA 92131
P: 858.695.3806 F: 858.695.3807
www.solarsolutions.info

-----Original Message-----
From: Murat Sahin [mailto:msahin@unicef.org]
Sent: Tuesday, August 10, 2004 6:36 PM
To: Janine Chen
Cc: 'Yukie Mokuo'; Nargiz Babakhanova; Ikram Davronov
Subject: Re: AquaPaks

Dear Janine,

Thank you and well come also convey our regards to Isabelle who had initiated a quick process. We have been in touch with Isabelle and we had sent an email on our receipt of 100 aqua packs. We are working now with Sanitary epidemiological station on establishing a testing system in the country. I would appreciate if you can share with us the
1. Reporting format that UNICEF offices are using for reporting back to you their experience with Aqua Pack.
2. Scanned copy of the shipping receipt.

Thank you and Best Regards

Murat Sahin
Child Development Project Officer
UNICEF Dushanbe
Telephone: ++992 372 218261/249108/249036
Facsimile: ++992 372 247788/510081
E-mail: msahin@unicef.org
Web: www.unicef.org

"Janine Chen"
<jchen@solarsolu
tions.info>

08/10/2004 11:55
PM

To: "'Murat Sahin'"
<msahin@unicef.org>
cc: "'Yukie Mokuo'"
<ymokuo@unicef.org>
Subject: AquaPaks

Dear Mr. Sahin,

Allow me to introduce myself. My name is Janine Chen and I am a student working at Solar Solutions for the summer. Along with my other responsibilities, I am attempting to continue all the wonderful work that Isabella has done. I wanted to follow up with you and find out whether or not you have received the shipment of 100 AquaPaks that we sent to you on 7/22/04. I would appreciate it if you notified me when you receive them... We are eager to hear of any results you may find when testing the AquaPaks... If you would like, we do have a test report example from UNICEF that I could forward to you to base your testing on.

I will be here at Solar Solutions until September 10th and look forward to working with you.

Sincerely,
Janine Chen

10080 Willow Creek Road
San Diego, CA 92131
P: 858.695.3806 F: 858.695.3807
www.solarsolutions.info

Sharon Hanson

From: Mark O'Donnell [modonnell@projectconcern.org]
Sent: Wednesday, August 13, 2003 11:23 AM
To: fhusson@solarsolutions.info
Subject: FW: AquaPak Solar Water Pasteruizer

Summary of nplementation of S.

Frank:

Here is the report that was forwarded to me by Nicolas. Please don't hesitate to contact him directly. Regards, mark

-----Original Message-----
From: Nicolas Coto
Sent: Wednesday, August 13, 2003 10:09 AM
To: Mark O'Donnell
Cc: John McPhail; Christine Mundt
Subject: RE: AquaPak Solar Water Pasteruizer

I'm sorry, but I forgot attach the file.

Nicolás Coto

-----Original Message-----
From: Nicolas Coto
Sent: Wednesday, August 13, 2003 9:06 AM
To: Mark O'Donnell
Cc: John McPhail; Christine Mundt
Subject: RE: AquaPak Solar Water Pasteruizer

Hi Mark, attach you can find the file with the delivery of the AquaPak Filters in community Cuevitas. I already had sent a report about this community.

Nicolás Coto

-----Original Message-----
From: Mark O'Donnell
Sent: Tuesday, August 12, 2003 10:43 AM
To: Nicolas Coto
Cc: John McPhail
Subject: FW: AquaPak Solar Water Pasteruizer

Nico:

Como estas? Que podemos reportar a Frank. Me ha llamado varias veces para un reporte. Gracias, mark

-----Original Message-----
From: Frank Husson [mailto:fhusson@solarsolutions.info]
Sent: Tuesday, August 12, 2003 9:37 AM
To: Mark O'Donnell
Subject: AquaPak Solar Water Pasteruizer

Dear Mr. O'Donnell

We were hoping to follow up on our last correspondence of January 17, 2003, regarding our solar water pasteurizer, the AquaPak. We wanted to confirm that you did indeed receive our shipment of the sample AquaPaks along with the related literature. As previously stated, we are seeking organizations interested in partnering with us to aid developing countries through the manufacture and use of the AquaPak.

We would very much appreciate your feedback regarding the AquaPak. You can contact us by email at fhusson@solarsolutions.info or fax us at (858) 675-3807.

Sincerely,
Frank D. Husson, Jr.

Sharon Hanson

From: Douglas Waserite Dodiyi-Manuel [dodman1000@yahoo.com]
Sent: Monday, January 03, 2005 12:08 PM
To: contact@solarsolutions.info
Subject: AquaPak Project

Dear Frank,

It has been quite a while since we communicated.

The delay from my angle was due to the political wall that I had brake in order to achieve what is to be achieved.

If you rememebr very well, you called me and we discussed at length, and then Isabella followed up and assisted me with contact information as to enable me get financial surpport for the project of establishing a factory in Nigeria and to that effect we communicated to prodigious and progressive extent with the Acumen Fund in America, which show interest but with the proviso of proof of the viability of selling this AquaPak in Nigeria though your company is to get us commercially link with the United Nations too.

Now, as a result of my surport for the Niger Delta People's Volunteer Force (Alhaji Dokubo Asari) and God; divinely positioning me for favour, I have been able to brake through the system and so, i'd want us to commense communication on our business plans in Nigeria.

I am an Ijaw man from the Niger Delta region of the Nigerian state and we have been maginalized for too long.

I shall also introduce the AquaPak to the Niger Delta Developement Commission (NDDC).

I hope to hear from you soonest.

Regards

Douglas Waserite Dodiyi-Manuel
Phone: +234 802 322 6434
+234 805 266 0929

"Be positive minded. No matter how dark things seem to be or actually are, raise your sights and see possibilities - for they're always there."- Dr. N. V.Peale-Douglas DodMan

---

SODIS Technical Note # 17

SODIS Use:
SODIS Bags and Temperature Sensors

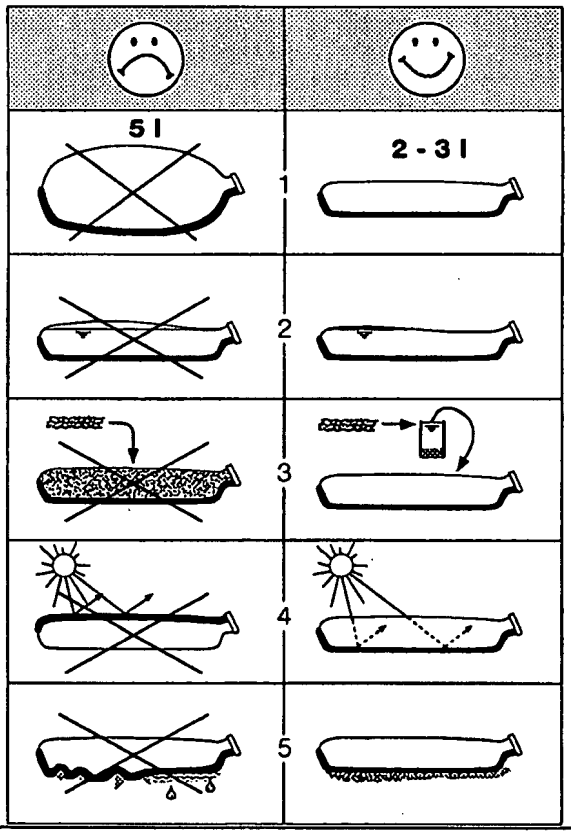
SUMMARY

SANDEC developed different prototype material which has been field tested in the SODIS demonstration projects. SODIS plastic bags were used to attract the interest of the people on the new water treatment method. Temperature sensors have been distributed to record whether the threshold water temperature of 50 °C has been attained or not.

BACKGROUND INFORMATION

Use of SODIS Bags

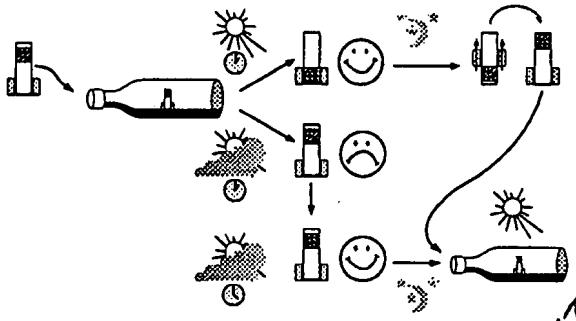
- Fill half of the bags with raw water
- Drive the air out of the bags and close them
- Place the bags in the morning hours on a spot receiving full sunlight throughout the day
- Place the bags in horizontal position on a firm blackened suport, preferably on a corrugated iron sheet/roof or tile roof
- Collect the bags in the late afternoon and store them in a safe place for cooling
- Consume the treated water directly from the bag using a clean glass or cup, store it possibly overnight for additional cooling



Use of Temperature Sensor

The SODIS Temperature Sensor (TS) is an aid for the user. It does not influence the SODIS process but is an indicator for the expected efficiency. When the temperature of 50°C is reached, the paraffine inside the TS melts and drops to the bottom. At this temperature, SODIS needs just one hour to inactivate the pathogens. The following day, the TS can be reused by pulling the screw to the opposite side of the paraffine and placing the TS inside the bag or bottle again (see Figure below).

When 50°C are not reached, the paraffine doesn't melt. If that's the case, the SODIS bag or bottle must be exposed for at least five hours to ensure inactivation. On very cloudy days and/or low temperature, an exposure for two consecutive days should be considered (see also Technical Note #11, Covered Sky Conditions).



Use of the Temperature Sensor. After the paraffine has melted down, the screw is pulled up, making the sensor ready for use again.

REFERENCES

Sharon Hanson

From: olof palme [olofpalme114@yahoo.co.uk]
Sent: Wednesday, November 17, 2004 4:17 AM
To: fhusson@solarsolutions.info
Subject: Re: Smokeless Alternative for Hot Safe Water – Solar-Powered Water Pasteurizer

Dear Sir,
We read with interest your solar based **AQUAPAK** and must admit that we were highly impressed by your innovation. Olof Palme Peace Foundation has for the last six years been working actively with the Government of Ghana, the World Bank and District Assemblies in providing potable water for deprived communities.

The water situation in some of these communities is so deplorable that, water borne diseases are very rampant in such communities.

It is as a result of this that we would want to learn more about the AQUAPAK technology and if possible team up with you so that together we can make potable water accessible to all. A baseline survey that the organisation conducted indicated that, the average Ghanaian, in spite of the poverty existing in the country can raise the $1.00 to purchase the Aquapak.

We therefore will be grateful if you can furnish us with additional information and other opportunities for us to work together.

Once again thank you for the concern you have shown for the welfare of others.

Yours in the service of humanity
SIGNED

EDMUND NSIAH-BOADI
Project Coordinator

Sharon Hanson

From: njoroge wangosho [wangosho@yahoo.com]
Sent: Monday, November 01, 2004 12:17 AM
To: fhusson@solarsolutions.info
Subject: RE: expression of interest in Aquapak

Dear Mr.Husson,
I stated in my last email that i am interested in Aquapak.I would be glad if you send me a proposal and any other information relevant on the subject.

faithfully yours,
j.n.wangosho

Frank Husson <fhusson@solarsolutions.info> wrote:

> Dear Mr. Wangosho:
>
> Thank you for your email. If you are interested in setting up an AquaPak manufacturing facility in Kenya, we would e glad to send you a proposal. Incidentally, there are a number of people and organizations already testing the AquaPak in Kenya including UNICEF in Nairobi.
>
> Looking forward to hearing from you.
>
> Sincerely,
> Frank Husson
>
> > -----Original Message-----
> > **From:** njoroge wangosho [mailto:wangosho@yahoo.com]
> > **Sent:** Tuesday, October 26, 2004 6:52 AM
> > **To:** fhusson@solarsolutions.info
> > **Subject:** RE: Smokeless Alternative for Hot Safe Water -- Solar-Powered Water Pasteurizer
> >
> > attention mr.husson.
> > i have studied the aquapak and i dare say it is a viable solution in offering affordable clean water for human consumption.the cost should is also very friendly to third world masses pockets.
> >
> > basically people use chemicals to purify their water here if they do not want to waste their time boiling the water.considering this options vis a vis your product...it definetely looks the superior method.note also that most people in kenya have no access to quality water...be it in rural areas or in urban places.that is why bottled mineral water is such a booming bussiness in urban places!
> >
> > setting out a manufacturing base here for aquapak would be a clincher.with proper education of masses on benefits of the product...it would definetely do well.what i do not know is how this can be achieved but if people get down on it it can be done.incidentally am a land surveyor...what you call in the west geomatic

engineering! so, needleess to say when am doing projects in rural areas i know clean water is a major problem.before anything i have pack my own water....well coz i don't think going down with stomach upsets while in the field is a great idea!!!good day.hear from you soon.

j.n.wangosho

Frank Husson <fhusson@solarsolutions.info> wrote:

Dear Mr. Wangosho:

Thank you for your email of October 23 and for looking on our web site.

The solar water purifier that you were looking at is an AquaCone solar distiller that distills any water (i.e. salt water, mercury-containing water, etc.) except water with VOC's (volatile organic compounds like gasoline) into pure water. The $200 price is our retail price. Even so, the cost to manufacture the AquaCone is approximately $50 each and it only produces relatively small amounts of water (liters/day). The AquaCone was the first product we developed and, after its introduction, we read a report by the NREL (National Renewable Energy Laboratory, a US Federal laboratory) that identified solar pasteurization as the best method to rid water to the biological pathogens found in most naturally occurring fresh water (lakes, streams, simple wells, etc.).

To accomplish this process, we developed the AquaPak which includes a temperature sensor to accurately measure the 67 degree C temperature needed to effectively kill 99.99 percent of the pathogens (bacteria, virus, and parasites) that can cause human illness. We sell this solar pasteurizer, the AquaPak, for $20 retail on our web page since it costs us approximately $6.82 to manufacture in San Diego with our $20/hour labor rates.

If the AquaPak was manufactured in a country with a $0.60/hour labor rate which is typical for many developing countries, the AquaPak can be made for approximately $1.00 each. Please review our web page and look at the AquaPak, solar water pasteurizer, not the AquaCone distiller. We hope to identify entrepreneurs and other business people in developing countries who will, with our help, set up a manufacturing line and build AquaPaks in Kenya.

After you have studied the AquaPak, please write again and we can

discuss further.

Sincerely,
Frank Husson
Solar Solutions

-----Original Message-----
From: njoroge wangosho [mailto:wangosho@yahoo.com]
Sent: Saturday, October 23, 2004 2:02 AM
To: fhusson@solarsolutions.info
Subject: Re: Smokeless Alternative for Hot Safe Water -- Solar-Powered Water Pasteurizer

HI HUSSON,

I am excited about the aqua pak.it should be able to significantly improve lives of many people who do not have access to electricity.

i saw the price ratings in ur website...i.e $200.it is way above reach for many in 3rd world countries like kenya where i live.needless to say whatever potential it has can not be realised in such places.

is there alternative....in order to improve on affordability?i would like to hear ur solutions on that aspect.

j.n.wangosho

Do you Yahoo!?
Yahoo! Mail Address AutoComplete - You start. We finish.

Sharon Hanson

From: Jaime Frias [jaime@idevn.org]
Sent: Monday, October 18, 2004 3:17 AM
To: fhusson@solarsolutions.info
Cc: Michael Roberts
Subject: Re: Info request - Attn - Janine

Very interested indeed to receive samples of the Aquapak. We can test them in IDE Vietnam's project sites.

For your information, IDE works in promoting sustainable solutions for the poor. Having said this is that if we engage in testing this technology is under the assumption that they will be commercialized. I wanted to just make the point as many NGOs follow a "subsidy" approach for disseminating products.

My contact info as follows:
Jaime Frias
Country Director - Vietnam (www.idevn.org / www.ideorg.org)
International Development Enterprises (IDE)

House No: 102 Linh Lang St.
Cong Vi, Ba dinh
Hanoi, Vietnam

Tel: (84-4) 7664249 / (84-4)7664245
Fax: (84-4)7664240
Mobile: 844-91-2356903

I am cc copying my colleague and friend Michael Roberts from IDE Cambodia. We would be very interested in having the chance to test the Aquapak in Cambodia as well,

Find attached his contact information:

Michael Roberts, M.S., P.Eng.
SE Asia Regional Director
International Development Enterprises
PO Box 1577, 22 Street 592, Toul Kork, Phnom Penh, Cambodia
Phone: (855) 23 880 604, Fax: (855) 23 880 059, Mobile: (855) 12 629 069
E-mail: mroberts@online.com.kh, Web: www.ide-international.org
Thank you in advance,

With best regards,

Jaime Frias
Country Director - Vietnam (www.idevn.org / www.ideorg.org)
International Development Enterprises (IDE)

House No: 102 Linh Lang St.
Cong Vi, Ba dinh
Hanoi

Tel: (84-4) 7664249 / (84-4)7664245
Fax: (84-4)7664240

Mobile: 844-91-2356903

—— Original Message ——
From: Frank Husson
To: Jaime Frias
Sent: Saturday, October 16, 2004 5:17 AM
Subject: RE: Info request - Attn - Janine

Dear Jaime:

Thank you for your email and for your interest in our solar-powered water pasteurizer, the AquaPak.

I am responding to your email on behalf of Janine Chen, who has completed her internship with our company and has returned to school.

Solar Solutions is a family-owned humanitarian company formed to develop inexpensive solar-powered water purification devices primarily for the rural populations in developing countries and refugees.

Our solar-powered water pasteurizer, the AquaPak, uses the pasteurization process discovered by Louis Pasteur over 150 years ago. The AquaPak works best in countries located between the Tropics of Capricorn and Cancer, but can also be used in the summer months in areas north and south of the Tropics in the spring and fall by adding a detachable reflector to help increase the solar radiation.

The AquaPak can be manufactured in the developing world for less than $1.00US when using a labor rate of $0.60US per hour or less. Our business model is to help identify entrepreneurs or local businessmen and help set up independently-owned manufacturing facilities in their country. Any profits derived from receiving equity from developing world businesses in exchange for patent license, know-how, and training would be returned to the local community. The funds would be used to distribute AquaPaks through missions and clinics to the needy people without the financial means to purchase an AquaPak.

Currently, the AquaPak is being tested by organizations, clinics, and churches around the world. Project Concern is conducting field testing in El Salvador; Rotary International is field testing in Mexico; and UNICEF is field testing in Malawi, Kenya, Nigeria, and Tajikistan.

Attached please find copies of test results conducted by two independent laboratories confirming the pasteurization effectiveness of the AquaPak. In addition, attached is a copy of the US Department of Energy's National Renewable Energy Laboratory report corroborating the AquaPak's pasteurization capabilities and inexpensive manufacturing cost. For your further review, included with this email is a copy of our preliminary business plan and manufacturing cost estimate.

We will be happy to provide sample AquaPaks to you for your review and testing in Vietnam. Please let us know if the samples should be shipped to your attention at the address shown in your email.

We look forward to the possibility of working with you to help provide potable water to those in need.

Sincerely,
Frank Husson
Solar Solutions LLC

-----Original Message-----
From: Jaime Frias [mailto:jaime@idevn.org]
Sent: Thursday, October 14, 2004 7:14 PM
To: contact@solarsolutions.info
Subject: Info request - Attn - Janine

Dear Janine,

I have received your message through WSP-EAP. IDE Vietnam has a long tradition with water technologies for safe water drinking, safe storage, purification and sanitation. I read the message you sent to Mr Pollard with interest. We would be very interested to learn more about your product. I envision that we may set up a pilot interventions and assess the commercial viability in rural Vietnam.

If this is of your interest, please let me know to move ahead.

With best regards,

Jaime Frias
Country Director - Vietnam (www.idevn.org / www.ideorg.org)
International Development Enterprises (IDE)

House No: 102 Linh Lang St.
Cong Vi, Ba dinh
Hanoi

Tel: (84-4) 7664249 / (84-4)7664245
Fax: (84-4)7664240
Mobile: 844-91-2356903

Sharon Hanson

From: Majid Alladina [malladina@utlonline.co.ug]
Sent: Thursday, October 14, 2004 10:53 AM
To: fhusson@solarsolutions.info
Subject: Uganda Opportunity

Frank:

I have been communicated to by some of your interens over the last little while. Thank you for keeping us updated. Any new progress or success stories from developing countries?

I am proposing the Solar Pasterizer to a USAID funded NGO in Uganda later today by way of an introduction to the product etc...They apparently have mandate for improving helath and sanitation in Africa. I have heard that they have teamed up with PUR to provide small sachets of some chemical that purifies water on contact and then filtered through a cotton cloth. These are supposed to be cheap and will be distributed by this NGO.

I am trying to see if we can piggy back on their distribution and actually have them take over the marketing fo the product for us. All we do is supply to the NGO. Now, I am sure I will need some features and benefits of the pasturizer versus the PUR approach.

Just wanted to keep you posted.

Regards,

Majid Alladina, CME
Managing Director
Infinity Media Ltd.
P.O. Box 21366
11 Portal Avenue
Suite 4B
Kampala, Uganda
infinitymedia_ug@yahoo.com
malladina@utlonline.co.ug
+256 (0)31-264-019/020 Tel
+256-71-722-711 Cell
1-413-403-2776 USA Tel/Fax
SMS via trueafrican.com
Number is 25671722711
To send SMS by e-mail to my Cell>>>"71722711@sms.ugandatelecom.com"

The Secret of greatness is simple: do better work than any other man in your field - and keep on doing it.

-----Original Message-----
From: Frank Husson [mailto:fhusson@solarsolutions.info]
Sent: Wednesday, February 18, 2004 3:33 AM
To: Majid Alladina
Subject: RE: distributor info

Dear Majid Alladina:

Thank you for your email and for your continued interest in our company. We're sorry for the delay in responding, however, we have recently moved our facility and experienced some difficulties with our email and internet and did not receive some inquiries including yours.

Our business model at Solar Solutions has been to develop and patent various solar-powered water purifiers designed for use by rural inhabitants that can be manufactured in developing world countries by local peoples for use in that country. In the case of the AquaPak, the glass WAPI (water pasteurization indicator) temperature detector is partially manufactured by Solar Solutions. We are working with entrepreneurs in various countries, including African countries, in an effort to help establish privately-owned local manufacturing facilities in developing world countries where the AquaPak could be manufactured for less than $1.00US when using a labor rate of $1.00US/hour or less. Once these foreign manufacturing companies are established, we could expect the distributor cost should be about $2.00 each.

For our part, any profits received from the developing world businesses for which we would receive equity in exchange for patent license, know-how, training, etc. would be returned to that community in the form of AquaPaks that we would distribute to needy people who are unable to purchase an AquaPak themselves through various groups including missionaries, clinics, etc.

Attached is a copy of our preliminary business plan and manufacturing cost breakdown. The AquaPak is currently manufactured only at our San Diego, California facility. We offer a 50% distributor discount off of the US selling price of $20.00, or $10.00 each FOB San Diego, California.

Please let us know if you would like to receive a sample AquaPak for your review and testing.

Sincerely,
Frank Husson

-----Original Message-----
From: Majid Alladina [mailto:malladina@utlonline.co.ug]
Sent: Saturday, February 14, 2004 10:57 AM
To: contact@solarsolutions.info
Subject: distributor info

I wrote to your organization many months ago and never received an acknowledgement or a response. I am interested in knowing more about your distribution plans for the Aqua paks and what your strategy is for Africa. I am interested in distribution of your products.

Please advise.

Regards,

Majid Alladina, CME
Managing Director
Infinity Media Ltd.
11 Portal Avenue
Suite 4B
Kampala, Uganda
malladina@utlonline.co.ug
+256-71-722-711

Sharon Hanson

From: CULHANE,THOMAS HENRY [tculhane@ucla.edu]
Sent: Thursday, September 30, 2004 7:42 AM
To: fhusson@solarsolutions.info
Cc: Mrslats@aol.com; lynnfreiji@yahoo.ca
Subject: RE: Thank you for the Aquapaks!

Dear Mr. Husson,

Yes, we did indeed receive the AquaPaks as well -- I've been laid up with a broken leg so I didn't get to inspect everything that came in; I was informed about the Aquacone because one of our teachers tried to set it up and came and asked me about it. Now that I'm on crutches and moving about I'm getting back into the swing of things.

The Aquapak concept is something very dear to one of my professors here in Egypt, Dr. Salah Arafa, head of the physics department at AUC (and principle architect of the Bassaissa Solar village in the Sinai) . He worked with several aid organizations many years ago to champion the idea (now widespread) of purifying water by putting it in the ubiquitous empty liter cola bottles and setting them in the sun for several hours. He will be delighted by the information on your brochure and we will work together to promote your product here.

With this email I want to call your attention to the World Conference On Energy for Sustainable Development: Technology Advances & Environmental Issues" that we will be presenting at from December 6-9 here in Cairo. The conference falls directly during our Goodwill tour, and Ted Stern, our violinist (and holder of 11 patents on space mission photovoltaics in his mild mannered day life!) will also be presenting a new concept for combo photovoltaic/solar heating for developing countries.

Perhaps you would like to present as well? They are still calling for papers (abstract submission deadline was today, but one of our student's fathers is the host of the event, so we have some flexibility, particularly for foreign attendees).

You can get all the relevant information by visiting:

http://www.aast.edu/mceet

In any event, we would love to take you up on your offer to work with us during the concert tour/conference event as it is a great target of opportunity.

What I would like to do is to introduce you to Ted Stern if possible, since you are both in San Diego.
(Ted, Solar Solutions can be found at 9950 Scripps Lake Drive, Suite 105, San Diego, CA 92131, phone 858 695 3806; Frank has included a mailing address below) .

Frank, I will also get a letter about the tour and its objectives written and sent on U.S. State Department Stationary and send you photos and get this ball rolling on our end!

Thanks for your response!

Sincerely,

T.H.

Board of Directors

Wadi Environmental Science Center
Cairo Egypt

Quoting Frank Husson <fhusson@solarsolutions.info>:

>
>
> -----Original Message-----
> From: Frank Husson [mailto:fhusson@solarsolutions.info]
> Sent: Monday, September 20, 2004 8:26 AM
> To: tculhane@mail.ucla.edu
> Subject: AquaCone and AquaPak
>
>
> Dear Mr. Culhane:
>
> Thank you for your email of September 10. I'm sorry for the delay in
> responding but I have been traveling and have just returned to the
> office.
>
> I'm glad that you have received the AquaCone and hope that you also
> received
> the AquaPak samples that were also shipped to the WADI Center. The
> AquaPak
> solar-powered water pasteurizer is much more energy efficient than the
> AquaCone solar-powered water distiller to purify fresh water that is
> contaminated with bacterial or viral pathogens.
>
> Our business model is to help entrepreneurs or local businessmen set up
> independently owned AquaPak manufacturing facilities. The AquaPaks
> could be
> manufactured in Egypt for approximately $1.00 each when using a labor
> rate
> of $1.00US/hour.
>
> We would appreciate receiving pictures for our web site of the AquaCone
> and
> the AquaPaks being tested at the WADI Center.
>
> The sustainable development goodwill ambassador tour that you are
> planning
> sounds very exciting and we would love to participate in any way that
> we are
> able. We could provide 25 or 30 AquaPaks for distribution to local
> health
> and government officials or entrepreneurs. Please let me know if this
> is
> something that you would like to do and I will have the samples shipped
> to
> you. Our address so you can send us the letter about the tour is Solar
> Solutions LLC, 10080 Willow Creek Road, San Diego, CA 92131, phone
> (858)
> 695-3806, fax (858) 695-3807.
>
> I look forward to working with you to help inform people about solar
> water
> purification.
>
> Sincerely
> Frank Husson
> Solar Solutions LLC
>
> -----Original Message-----
> From: T.H. Culhane [mailto:tculhane@ucla.edu]
> Sent: Friday, September 10, 2004 3:26 PM
> To: contact@solarsolutions.info
> Cc: lynnfreiji@yahoo.ca; Pia Lassak; james@totaltraining.com;

> Mrslats@aol.com; Anais; AlLaham, Eliza F
> Subject: Thank you for the Aquacone!
>
>
> Dear Sirs/Madams,
>
> I have returned to Cairo from performing in a music festival in Munich
> for
> the World Youth Alliance and discovered to my delight that you sent our
> science center an Aqua Cone trail unit. We are very appreciative and
> will
> be putting it to use next week when we start receiving students and
> visitors
> during the new academic year. We have just finished building our own
> large
> Solar Distiller based on observations of German units featured at the
> Freiburg Solar Conference that I attended in Germany two months ago,
> and
> will be doing a unit on solar water purification. We shall send you
> pictures of how we are demonstrating your unit and hope that we can
> create a
> market for your technology here. (I became an enthusiast for your
> Aquacone
> when I purchased one through the Los Angeles Real Goods outlet for my
> field
> site in rural Guatemala where it helped me and my team provide clean
> water
> for our research living on a contaminated lake. I think we can see
> similar
> benefits here in the Arab World.)
>
> As a member of the Board of Directors at the Wadi Center I am currently
> putting together a major event with the U.S. State Department that you
> might
> be interested in participating in. From November 27th - December 13th
> the
> American Cultural Affairs office, in conjunction with the Wadi Center,
> will
> be hosting a "sustainable development goodwill ambassador tour",
> bringing
> the American rock and world music band "Circus Guy" back to the Middle
> East
> for its eighth tour since the September 11th tragedy. This time
> "Circus
> Guy", which has toured Syria, Kuwait, Oman, Jordan, Israel, Palestine,
> Cyprus and Bahrain, will perform throughout Egypt, playing, among
> their
> repertoire, original songs about renewable energy and demonstrating new
> energy technologies on stage along the way. At least three of the
> concerts
> will be powered by the sun and the wind (two at our Wadi Center, and
> one
> charity concert at the Bassaissa Solar demonstration village in the
> Sinai)
> and the theme of tour will be, essentially, "Solar Solutions to World
> Problems" (we have a song called "The Future is Now" with a multimedia
> slide
> show that will accompany the music). Given that you ARE
> SolarSolutions, we
> would be happy to involve you in any way possible -- we would be happy
> to
> promote and explain your products and give any representative you may
> have
> in the area time to meet with the government officials and business
> leaders
> and public in Egypt.
>

> If you are interested, please give me a mailing address and I will send
> a
> letter explaining the tour from the U.S. State Department on their
> letter
> head. Our goal is to get as many companies working with solar energy
> involved in the tour as possible. A few weeks ago I was in Switzerland
> at
> the Mont Soleil Renewable Energy Powered Music Festival (Europe's
> first) and
> participated as a musician and co-ordinator in Roseville Electric's
> Renewable Energy Powered Earth Day festival in Northern California two
> years
> ago. We feel this is an unprecedented opportunity to build bridges of
> peace
> in the Middle East and promote beneficial technologies that can
> guarentee a
> brighter future for all.
>
> Thanks again for sending us the Aquacone. We look forward to a
> rewarding
> partnership.
>
> Sincerely
>
> T.H. Culhane
> Board of Directors
> Wadi Environmental Science Center
> Cairo Egypt
> ----- Original Message -----
> From: <tculhane@mail.ucla.edu>
> To: <contact@solarsolutions.info>
> Cc: <tculhane@ucla.edu>
> Sent: Sunday, August 15, 2004 4:22 PM
> Subject: Reselling/Distributing in Egypt
>
>
>
> Dear Sirs/Madams,
>
> We are an Environmental Science Education Field Center on the desert
> road
> between Cairo and Alexandria in Egypt which services 500 students and
> their
> teachers each week. Our parent company is Wadi Foods, a major supplier
> of
> olives, olive oil, chicken and chicken feed throughout the middle east.
> We
> have three retail stores, one at the Field Center, and two in the city,
> and
> we are beginning to stock the shelves with products that are linked to
> our
> sustainable development and environmental science curriculum. We are
> interested in providing products such as yours to the Egyptian people
> and
> are interested in being distributors/resellers of the Aquacone, the
> Aquapak
> and other solutions for developing countries.
>
> Sincerely yours,
>
> Taha Culhane
> Board of Directors
> Wadi Field Center
>
>
>
>

> If you wish to buy a AquaPak or Aquacone you can call us at (858)695
> 3806
> or fill out the enclosed form and send it via fax at (858)695 3807 or
> mail
> it with check to 10080 Willow Creek Rd. San Diego CA, 92131 If you are
> interested in becoming a distributor or reseller, please enter your
> information below and either call us at the above number or email us
> email us
>
> Please provide the following contact information:
>
> Name
> Lynn Freiji, founder/director
>
> Organization
> Wadi Environmental Science Field Center
>
> Address
>
> 61 Kuds El Sherif
>
> City
> Mohandiseen
>
> State/Province
> Cairo
>
> Zip/Postal code
>
> Country
> Egypt
>
> Phone
> 0020122177090
>
> Fax
> 002023447136
>
> E-mail
> lynnfreiji@yahoo.ca
>
> Please provide the following order information
>
> Quantity
> Product
>

> AquaCone, $200/ each
>
>
> AquaPak, $19.95/ each
>
>
> 7.75% sales tax will be added for California residents. Shipping
> charges
> add $4.95 each within the United States For International orders,
> contact
> us for the shipping rates.
>
>
>
>
> ---
> mail2web - Check your email from the web at
> http://mail2web.com/ .
>
>
>

Sharon Hanson

From: Kevin Porter [kevin@solarcookers.org]
Sent: Monday, August 02, 2004 9:47 AM
To: fhusson@solarsolutions.info
Subject: RE: AquaPak

Hi Frank,

I tend to move slowly on these type of decisions, but I'm trying to change my ways :-)

I'd like to order 20 AquaPaks. Please send to the address below (1919...) and include an invoice. Let me know if this doesn't work for you. Thanks!

Kevin

At 08:36 AM 7/30/2004 -0700, you wrote:
>Dear Kevin:
>
>Thank you for your email. It is good to hear from you! I am doing very
>well, thank you, and hope that you are, as well.
>
>We would be very happy to offer the AquaPak to you for $10.00 each FOB San
>Diego which is a 50% discount from our normal retail price of $20. An
>additional 5% discount would also be extended to you on quantities of 20 or
>more AquaPaks.
>
>I look forward to hearing back from you. Please let me know if we can be of
>any other assistance.
>
>Best regards,
>Frank
>
>-----Original Message-----
>From: Kevin Porter [mailto:kevin@solarcookers.org]
>Sent: Thursday, July 29, 2004 4:41 PM
>To: contact@solarsolutions.info
>Cc: Bev Blum; Bob Metcalf
>Subject: AquaPak
>
>
>Hi Frank,
>
>It's been a while since we last communicated. I hope you are doing well. I
>hear from Bob Metcalf that the WAPI wax you are making for him is working
>well. Thanks so much for you help with this.
>
>We have been thinking of expanding our product offerings and are exploring
>the AquaPak as one item we might try to carry. Sales has been only a minor
>part of what we do, but it is an important service that we offer and we
>want to expand in the years to come. I wouldn't imagine that we would sell
>a large volume of AquaPaks, but perhaps a few dozen per year. (For
>reference, we sell 700-800 or so solar cookers per year out of our
>Sacramento office.) What would be the terms if we were to stock 20 or 30 of
>these at a time?
>
>Thanks,
>Kevin
>
>
>.....
>Kevin Porter
>Education Resources Director

>Solar Cookers International
>1919 21st Street, Suite 101
>Sacramento, CA 95814, USA
>tel: 916-455-4499
>fax: 916-455-4498
>kevin@solarcookers.org
>www.solarcookers.org

Sharon Hanson

From: Hank Reinhoudt [Hank.Reinhoudt@unilever.com]
Sent: Friday, February 27, 2004 7:27 AM
To: fhusson@solarsolutions.info
Subject: RE: More Aquapak samples required

Dear Frank,

Thank you very mcuh. I'll keep you updated on our progress.

Kind regards,

Hank

-----Original Message-----
From: Frank Husson [SMTP:fhusson@solarsolutions.info]
Sent: Thursday, February 26, 2004 7:57 PM
To: Hank Reinhoudt
Subject: RE: More Aquapak samples required

Dear Hank:

Thank you for your email. The AquaPaks will be sent to you today via US Post Office Global Priority mail.

I look forward to hearing from you after you have received the samples.

Sincerely,
Frank

-----Original Message-----
From: Hank Reinhoudt [mailto:Hank.Reinhoudt@unilever.com]
Sent: Thursday, February 26, 2004 1:51 AM
To: fhusson@solarsolutions.info
Subject: FW: More Aquapak samples required

Dear Frank,

I would appreciate if you could send the Aquapacks to the following address:

Unilever Research and Development Vlaardingen
LFEDC-GTC
Att: Hank Reinhoudt
Olivier van Noortlaan 120, 3130 AC Vlaardingen
The Netherlands

Thank you in advance,

Kind regards,

Hank

-----Original Message-----
From: Suresh Nadakatti [SMTP:Suresh.Nadakatti@unilever.com]
Sent: Wednesday, February 25, 2004 11:43 PM
To: Reinhoudt, Hank
Subject: FW: More Aquapak samples required

Dear Hank,

Pl. send your mailing address to Solar Solutions.

Regards,

Suresh

-----Original Message-----
From: Frank Husson [SMTP:fhusson@solarsolutions.info]
Sent: Wednesday, February 25, 2004 2:38 PM
To: Suresh Nadakatti
Subject: RE: More Aquapak samples required

Dear Suresh:

Thank you for your email. We look forward to receiving your colleague's address so we can ship the AquaPaks to him.

Best regards.

Sincerely,
Frank

-----Original Message-----
From: Suresh Nadakatti [mailto:Suresh.Nadakatti@unilever.com]
Sent: Wednesday, February 25, 2004 10:53 AM
To: fhusson@solarsolutions.info
Cc: Reinhoudt, Hank
Subject: More Aquapak samples required

Dear Frank,

There is more interest regarding your technology from Unilever R&D. My colleagues in Holland would like to test the technology for few of their applications. Pl. let me know if you would be able to send 3 aquapaks to my colleague Hank Reinhoudt in Holland. By a copy of this message I am requesting Hank to send you his mailing address.

I will be returning to India next week. If I need any info or help I will contact you. Hopefully we will be able to work together in the near future.

Thanks & regards,

Suresh

Dr. Suresh Nadakatti
Unilever Technology Ventures
812, Anacapa St. Ste A
Santa Barbara, CA 93101
Tel : 805 963 0250
Fax : 805 963 0270
Cell : 805 331 3242
www.unilevertechnologyventures.com

Sharon Hanson

From: Dr. Jeff Goodman [jgoodman@imcworldwide.org]
Sent: Thursday, December 18, 2003 9:17 AM
To: fhusson@solarsolutions.info
Cc: donald@aloha.net
Subject: RE: AquaPak Solar Water Pasteurizer

Dear Frank Husson:
I thank you for writing. Don sent me your e-mail address, but it was not accessible. I am currently in Sierra Leone and spent a few days in Liberia working on a DDR project Disarmament, demobilization and reintegration of the ex-combatants in that war-torn country.
I tried to access your web site, but my isp connection is too slow. I will going to the US tomorrow for the holidays and will try to get to your web site for more info. Your product sounds interesting.

Liberia fits within the parameters of your product and I can tell you that clean water in a huge problem here. I have some interesting statistics re the availability of water (or the lack of it) and will forward them to you so that you will have a greater understanding of how large the problem is

We should keep communications open. Please e-mail me again next week in case I get caught up in the holiday cheer with my two sons.

My organization is the International Medical Corps. You might look them up on the web to see their extensive programs throughout the World. I am proud to be a part of the team in Liberia.

Thanks to Don for the introduction.

Jeff

Sharon Hanson

From: lucy mulenkei [mulenkei@yahoo.com]
Sent: Saturday, October 11, 2003 7:50 AM
To: Frank Husson
Cc: paranlolo@newtechadvisors.com
Subject: Re: AquaPak Solar Water Pasteurizer

Dear mr. Frank Husson,
Sorry to have taken that long to write back. I have finally gotten a feed back back from the community. I visited there and actually took water from it. We had a short demonstration from David Fabiaono Lolosoli who is one of the community leaders. He tells me he has even found someone who can make them here. I have requested him to communicate to you and you can do the same so that we can see how it will work so that we take it to the other communties.
His email is paranlolo@afriacaonline.co.ke
I have copied this email to him too.
Hope to hear from you again
Lucy

Frank Husson <fhusson@solarsolutions.info> wrote:

> Dear Lucy:
>
> I hope you made it home safely from your trip to New York. I am anxious to get your feedback on the AquaPak solar water pasteurizer that I gave to you at the UN.
>
> We are anxious to identify entrepreneurs and businesses in Kenya and other African countries who would want to manufacture this product. When using a labor rate of $1.00US per hour or less, the AquaPak could be manufactured for approximately $1.00 each.
>
> I did not get a business card from the American Indian who was leading the discussion from the Indigenous people's contingent and was wondering if you could provide me with his name and email address. I would like to follow up with him as I was able to give him an AquaPak the day after we met.
>
> If there is any other information or samples you would like, please do not hesitate to contact me.
>
> Sincerely,
> Frank Husson

Sharon Hanson

From: Pat Crowell [pcrowell@san.rr.com]
Sent: Sunday, September 15, 2002 9:12 AM
To: frank husson
Cc: ron beaubien; ed futa
Subject: rotary meeting report

Dear Frank,

Yesterday I met with my friend, Ron Beaubien, who will be an International Director of Rotary starting next year, and with Ed Futa, who is the executive secretary of Rotary International (R.I.), out of Evanston, Il. I gave them the two bags and the literature that you had given me, and we had a lengthy discussion about the project, its potential , and Rotary's possible involvement.

It is fair to say that both were impressed with the device and its potential for helping solve the problem of potable water, in which R.I. is very much interested. They will do some thinking, and possibly brief the other members of the R.I. board and also possibly seek a committee to study how best to proceed. All in all I thought it was a most productive meeting and the subject got thoroughly covered.

One fallout of the meeting is that both of them know a very prominent rotarian in Mexico City. His name is Salomon Pesel. He owns a plastics business, making all kinds of devices. He will be calling me this week, and I hope I can send him some information and talk him in to coming up here and getting him to meet and talk with you. He may just be the person who could put together a venture to manufacture these units in

Mexico. I will call you when he contacts me and we will see where that will lead.

Again thank you for providing these items so that we can spread the word and get this thing off the ground.

Best Regards, Pat

Sharon Hanson

From: Nicolas Coto [ncoto@projectconcern.org]
Sent: Thursday, September 25, 2003 10:55 AM
To: Frank Husson
Subject: RE: AquaPak Solar Water Pasteurizer

Hi Mr. Husson:

I'm sorry for my answer late, and for my English, as well. I want to thanks you for your help to our communities, again. The people from Las Cuevitas are very happy because now they can ensure that the water that they are drinking is clean. In the most of the cases the man of the family is using the filter when he goes to work the land in his agriculture activities. This is due that in the most of the places where they work does not have clean water. This situation does that the other members of the family; they don't have any filter for the house. Would be better if we can give them other filter.

In the next days, I'm going to send you another report.

Thanks,

Nicolás Coto

-----Original Message-----
From: Frank Husson [mailto:fhusson@solarsolutions.info]
Sent: Wednesday, September 03, 2003 11:11 AM
To: Nicolas Coto
Subject: FW: AquaPak Solar Water Pasteurizer

Dear Nicolas:

We are forwarding a copy of our earlier email as we have experienced some problems with our email recently and wanted to make sure you received it.

We look forward to hearing from you.

Sincerely,
Sharon Hanson

-----Original Message-----
From: Frank Husson [mailto:fhusson@solarsolutions.info]
Sent: Wednesday, August 13, 2003 3:26 PM
To: ncoto@projectconcern.org
Subject: AquaPak Solar Water Pasteurizer

Dear Nicolas:

Thank you very much for the two page report with pictures about the implementation of our solar-powered water pasteurizer in the community of Cuevitas. Your report was very well done!

From reading the report, it sounds like an additional 20-30 AquaPaks could be used by the families with small children and by the health promoters. If you would like, I will send these units to you. Please let me know your shipping address.

The current AquaPak is designed to pasteurize water at 67 degrees C and has an orange WAPI (Water Pasteurization Indicator). The original AquaPak used a yellow WAPI and pasteurized water at 70 degrees C. Either temperature will work, but the 67 degree C will allow you to produce more potable water.

I will send your report to some of the other groups, including UNICEF and the Rotary International, who are interested in the potable water problem of rural people. If you have been able to collect any statistical data on the amount of diarrhea-related diseases associated with pathogen-laden water, it would be interesting to know the reduction in these cases that might be attributable to the AquaPak.

If you have any other input or pictures, we would very much like to hear from you. Please keep up the good work! I look forward to working with you to provide potable water to the people of Cuevitas.

Sincerely,
Frank Husson

Sharon Hanson

From: Pat Crowell [pcrowell@san.rr.com]
Sent: Thursday, September 26, 2002 3:38 PM
To: frank husson
Subject: FW: Rotary Water

From: Niles Sharif <nrs00@pacbell.net>
Date: Thu, 26 Sep 2002 15:31:06 -0700
To: Wendell Cutting <wendell.cutting@gcccd.net>
Cc: "Robert E. James" <Rejames5428@cs.com>, pcrowell@san.rr.com
Subject: Rotary Water

Wendell --

Our club is contemplating getting involved in a clean water project in San Quintin, Mexico. Yesterday, several of our members met with PDG Pat Crowell who also is interested in doing clean water projects in third world countries. The project our club is looking at involves ways to store fresh water so as to keep it fresh. Pat's projects focus on ways to purify dirty water.

Pat introduced us to a water purification technology that involves pasteurization through solar heating. The device is a very basic invention which can sterilize about 5 liters of contaminated water in 70 or so minutes. Believe it or not, its most significant component is simple bubble wrap plastic. The device is portable and can even be fitted to be worn like a backpack. Basically, you fill the device with water, stick it in the sun, and in approximately 70 minutes you have fresh water. Each unit can be produced for about $1 per unit if manufactured in Asia, for example (as opposed to about $5 in the US).

Pat is in the process of testing the use and efficiency of the units in the field and developing a written protocol for their distribution. At this time, their are units in the field in rural parts of Mexico and a few other places, but he is looking for additional test locations. I thought perhaps that with your extensive travel experience you might know of some locations where this technology would be useful, and that you also might be willing to put us in contact with people who could help get the devices into the field. I told Pat that you would be a good person to talk to.

Let me know if this is something that interests you and if you think you can help.

Hope all is well.

Niles R. Sharif, Attorney at Law
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